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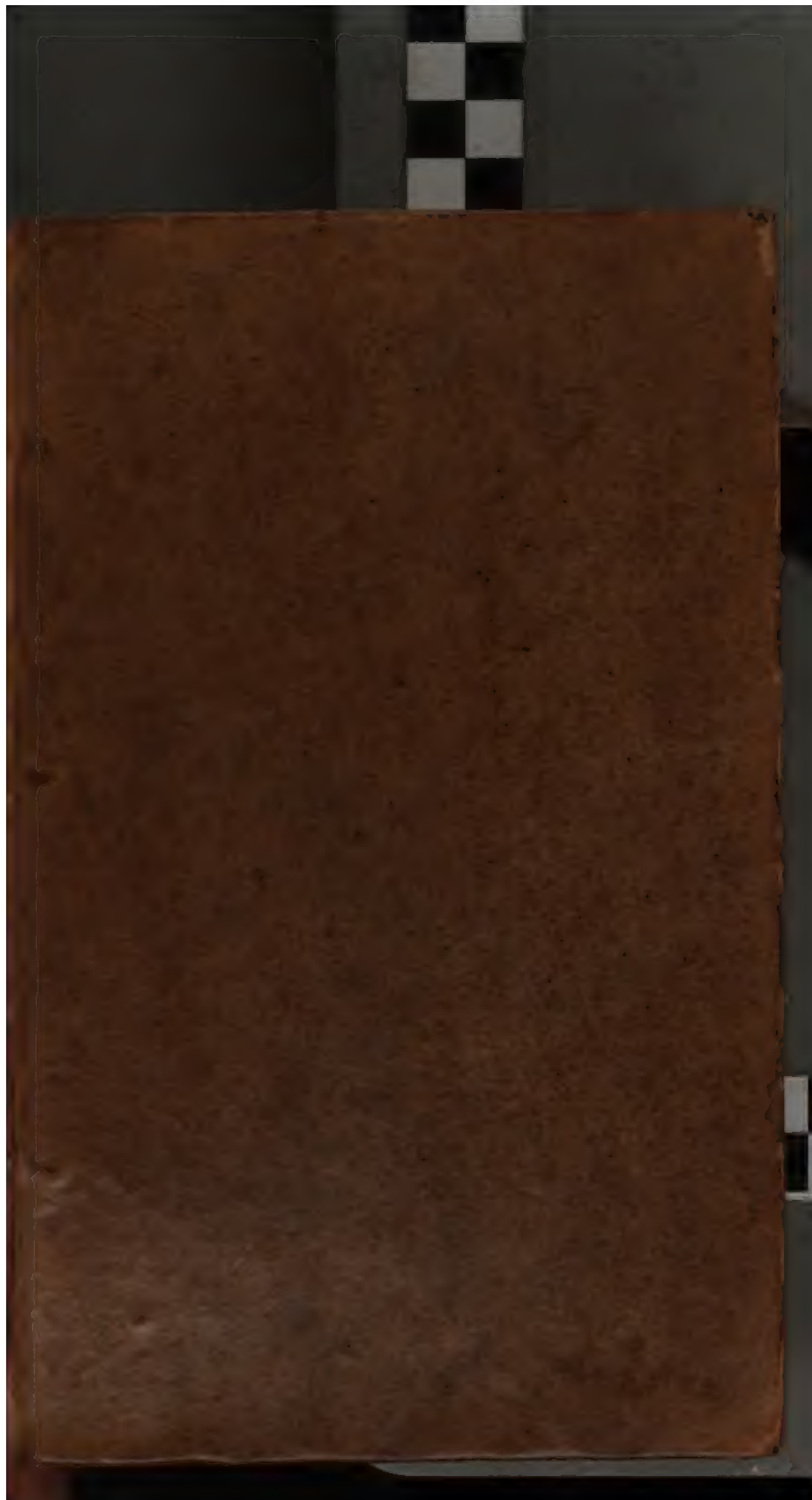
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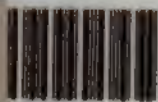
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S U R G E R Y:

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anatomical description of the parts in which these diseases are seated.

Minuteness on this subject would lead to a greater length than the extent of this work will admit, nor does it appear to be necessary : I shall therefore give only such an account of these parts, as the nature of the diseases, and the operations to be described, seem to require.

The eyes, and part of their appendages, are placed in two bony cavities, termed the Orbits, formed by a conjunction of the inferior part of the frontal bone with several other bones of the head and face ; namely, with the ossa maxillaria, ossa malarum, ossa unguis, os ethmoides, os sphenoides, and ossa palati. All the upper part of the orbits is formed by the orbital processes of the frontal bone ; and the same processes form a considerable vacuity in each orbit towards the external canthus of the eye, in which the glandula lachrymalis is lodged. The inferior part of the orbits is formed by the ossa maxillaria and ossa malarum, which also form part of the
sides

sides or angles of each orbit ; the former stretching towards the internal canthus, and the latter towards the external angle of the eye. The bottom or back-part of each orbit is formed by the ethmoid, sphenoid, and a small portion of the palate bones ; and a small part of the internal corner or angle of each orbit is filled up by the os unguis.

As this last-mentioned bone, the os unguis, is frequently the subject of a nice operation, it is more particularly necessary for surgeons to be well acquainted with its structure and situation. A considerable part of it is so thin and brittle, that a perforation may be made in it with very little force ; with less, indeed, than is commonly imagined ; for not being thicker than fine paper, the point of a sharp instrument is easily made to pass through it. The internal surface of the os unguis, which in part covers the cells of the ethmoid bone, is somewhat rough ; but its external surface is smooth, and consists of two depressions or con-

cavities divided by a ridge. This ridge forms the boundary of the orbit at the internal canthus of the eye, and one of these depressions forms the very point or angle of the orbit; while the other concavity, which lies between this ridge and the nasal process of the maxillary bone, serves to lodge in its upper part, where it is largest, the lachrymal sac, and below it protects the duct leading from this sac into the nose, where it terminates immediately below the superior edge of the lower os spongiosum. The nasal duct of the lachrymal sac admits a probe of the size of a crow's quill; and it continues of this diameter till within a little of its termination in the membrane of the nose; where, by running in an oblique direction between the layers of this membrane, in a manner similar to the termination of the ureters in the bladder, it is in general found contracted to a very narrow point.

The principal part of each orbit is filled by the Ball or Globe of the eye, a body composed of several membranes or coats,

coats, inclosing fluids or liquors of different consistences, improperly termed the *Humours* of the eye.

Anatomists have considered the coats of the eye as numerous, but three only can be distinctly traced; namely, the Sclerotic, the Choroid, and the Retina. The former has indeed been supposed to consist of different coats, to all of which names have been appropriated, namely, The tunica albuginea, the cornea opaca, cornea lucida, &c.; and even the choroid has been supposed to be formed of different tunics: But although a tedious maceration may separate some of these parts into different lamellæ, the knife of the anatomist is not able to do so; and as distinctions of this kind can tend to no useful purpose, they ought not to be retained.

The fat and different muscles of the eye being separated from it, the sclerotic is the first coat that presents itself; and it is found to surround the whole globe of the eye, which is not the case with any

of the others. In the anterior convex part of the eye, which in a healthy state is always transparent, this membrane is in general termed the Cornea. The posterior part of it is thick, strong, and perfectly opaque: It is this part of it that has commonly been termed the Sclerotic Coat, or, as I have already observed, the Opaque Cornea. But although the transparent cornea can be easily separated into different layers, which cannot be so readily done with the other; a circumstance which has led some anatomists to consider them as distinct coats; yet as the one is evidently a continuation of the other, and as they are both supplied with the same blood-vessels, there seems to be no good reason, as I have just remarked, for the distinction being retained.

All the opaque part of the sclerotic coat is lined with the second coat of the eye, the choroides; a dark, or dusky red coloured membrane, which every where adheres to it with firmness, particularly at a small distance behind the commencement

ment of the transparent cornea, where a circular whitish ring is formed by this junction of the choroides with the sclerotica, commonly termed the *Ligamentum Ciliare*. From this junction of the choroid with the sclerotic coat, a perforated kind of curtain or septum is produced, which from the variety of its colours, is termed the *Iris*. The perforation in the centre of this membrane is termed the *Pupil*, and serves to admit the rays of light to the bottom of the eye.

Towards the middle of the iris, we perceive a number of radiated lines running from the circumference to the centre: These are denominated the ciliary processes, and on their action the contraction and dilatation of the pupil appear to depend; for it seems to be doubtful, whether any circular fibres exist in the iris or not.

Ruyfch, as well as other anatomists, have imagined, that the *tunica choroides* consists of two distinct coats, and the iris

has been in general considered as a continuation of one of these ; but later discoveries tend to shew that the choroides in the human eye consists of one simple indivisible tunic, and that it is different in every respect from the iris.

The third and most internal coat of the eye is the Retina, which seems to be an expansion of the optic nerve. It does not line the whole cavity of the eye, but appears to terminate over the anterior edge of the sac or capsule of the vitreous humour to be hereafter described.

Vision we suppose to be produced by the rays of light being applied in a certain manner to the retina : It is therefore obvious, that a sound state of the optic nerve, by which this membrane is produced, is highly necessary for the purposes of vision, and we conclude with much probability, that the nerve is sound, when the usual contraction and dilatation of the pupil take place on light being applied to, or removed from, the eye : For in a healthy state of this organ, such a connection

connection subsists between the optic nerve and the iris, that the latter always contracts or dilates, just in proportion to the quantity of light thrown upon the other.

These are the only proper coats or coverings of the eye; but there are two membranous expansions which likewise cover a considerable portion of the back part of the globe, which by many have been enumerated as part of its tunics; namely, the albuginea, and tunica conjunctiva: The former, however, is formed entirely of the tendinous attachments of the muscles of the eye; and the latter is a continuation or reflection of the membrane that lines the internal surface of the eyelids.

The cavity formed by these coats or membranes, is filled with three kinds of substances, or humours as they are commonly termed: Namely, the vitreous; the crystalline; and the aqueous. All the posterior part of the eye is filled with the vitreous humour, which is perfectly transparent,

transparent, and of a gelatinous consistence: This humour is completely surrounded by a very delicate membrane, which likewise appears to pass through the substance of this gelatinous mass, and to confine it in a kind of cellular texture or net-work. In the anterior surface of the vitreous humour, we find a depression exactly opposite to the pupil, for the purpose of receiving the crystalline humour, a substance of a much firmer texture than itself, and of a rounded or lenticular shape. This body, or the Lens as it is commonly termed, is retained in its situation by a very fine membrane or capsule, which appears to be formed by the capsule of the vitreous humour, separating or dividing at this part into two distinct laminae. It has indeed been supposed, that the crystalline lens has a cyst or capsule peculiar to itself; but I have never been able to distinguish it, nor has any sufficient evidence ever been given of this having been done.

The

The whole anterior part of the eye, from the termination of the vitreous and crystalline humours, to the internal surface of the transparent cornea, is filled with the aqueous humour, a thin transparent fluid. By the iris, already described, this part of the eye is divided into two unequal departments : The smallest of these, which is scarcely a tenth of an inch in width, and lies between the iris and the capsule of the vitreous humour, is termed the Posterior Chamber ; and the other, which is considerably larger, and occupies the whole space from the iris to the cornea, is called the Anterior Chamber of the eye. Although these two divisions of the eye, however, are perfectly distinct, it is obvious that they must communicate at the pupil, the opening in the centre of the iris.

The muscles of the eye are six in number ; namely, the levator oculi, the depressor, adductor and abductor, the obliquus superior and inferior. By these, all the motions of the eye are performed.—

The

The first five arise from near the bottom of the orbit, at no great distance from each other; and the last originate from the orbital process of the maxillary bone, near to its junction with the os unguis. They are all inserted into the tunica sclerotica, below the adnata or tunica conjunctiva.

The constant motion of the eye requiring it to be kept soft and moist, it is for this purpose plentifully supplied by a fine transparent fluid, the tears. This secretion is now known to depend in a great measure upon a large glandular body, the glandula lachrymalis, seated immediately above the eye, in the depression that I formerly mentioned in the os frontis, near to the external angle of the orbit. There is likewise in the internal or great angle of the eye, a small red coloured body, termed the Caruncula Lachrymalis, which till of late was supposed to be the principal origin of the tears. This, however, is not the case; and there is even reason to doubt

doubt whether. this substance is of a glandular nature or not.

But although the tears are chiefly secreted by the glandula lachrymalis, there is much reason to imagine that they are partly produced by exsudations from the whole surface of the eye, as well as from the membrane of the eyelids. But this being in some measure foreign to our subject, I shall not at present consider it further.

The eye, and its appendages, that have just been described, are supplied by several arterial branches, either directly from the internal carotid, or from the maxillary arteries. None of these, however, are of any considerable size ; at least, before reaching the eye, they are in general found divided into branches of no great magnitude ; a circumstance of some importance for practitioners to recollect : For, on the supposition of these arteries being larger than they are, surgeons have commonly been deterred from operating with that freedom on the eye which they otherwise

otherwise might do, particularly in the total removal or extraction of the eyeball; an operation to be hereafter described. The veins of the eye terminate partly in the external, and partly in the internal jugular veins.

Vision, as I have already observed, depends in a great measure on the optic nerve which passes in from the brain at the bottom of the orbit; but the eye does not depend entirely upon this nerve: It receives branches from several others, particularly from the fourth, fifth, and sixth pairs.

The globe of the eye and other parts contained in the orbit, are covered by two very moveable membranes, called *Palpebræ*, or Eyelids, formed chiefly of the skin and a smooth fine membrane already described, the *tunica conjunctiva*, with an intermediate thin cartilaginous body termed *Tarsus*, on which the cilia or eye-lashes are placed. Both the upper and under eyelids are supplied with this thin cartilage; at the extreme border

der of which, towards the roots of the cilia, a number of small follicles are placed, named after their discoverer, the follicles or glands of Meibomius; from whence is poured out a viscid sebaceous matter, commonly termed the Gum of the eyes.

The motion of the eyelids is performed entirely by two muscles, the orbicularis palpebrarum, and the levator palpebræ superioris. The former is common to both the eyelids: It originates by a small tendon at the inner angle of the eye, and by fine fleshy fibres from the orbital process of the maxillary bone, and is inserted by a small round tendon into the nasal process of the same bone. A few of the tendinous fibres of this muscle are spread upon, and seem to be inserted into, the anterior surface of the lachrymal sac. The use of this muscle is to draw the eyelids together, and to compress the eye-ball.

The levator palpebræ superioris originates from the bottom of the orbit, and
is

is inserted into the membranous and cartilaginous parts of the upper eyelid: The sole use of this muscle seems to be to raise this covering of the eye.

I have already described the lachrymal sac and duct, by which the tears are conveyed to the nose: We have now to attend to the manner in which they pass from the eyes to the sac. After the tears have moistened the eyes, they would at all times be falling over the cheeks, if not carried off in some other manner: A very beautiful mechanism, however, is employed by nature for this purpose.

Near to the internal angle of each eye, we perceive two small points or protuberances, one on the border or edge of the upper eyelid, and the other exactly opposite to it on the under eyelid. In the centre of each of these there is a small hole or opening; termed the *Punctum Lachrymale*, which we find to be the mouth of a small conduit leading to the lachrymal sac, and by which the tears are conveyed to it. These canals are of
such

such a size as to admit a probe somewhat larger than a hog's bristle. They are each about four-tenths of an inch in length; and after running in an oblique direction along the edge of the eyelids, they commonly join into one common trunk immediately before they enter the lachrymal sac, somewhat more than the tenth of an inch below the upper end of it.

The protuberances on which these canals originate, are evidently irritable, as may readily be seen on their being touched with a probe or any acrid matter. This renders it probable that they are endowed with the power of absorbing the tears; and this fluid we find is at all times applied to the mouths of them, by a kind of membranous production of the tunica conjunctiva, of a semilunar form, lying in the internal angle of the eye. This membrane is by anatomists termed *Valvula Semilunaris*. In order, however, to render the anatomy of these parts as intelligible as possible, a cir-

cumstance of much importance in the treatment of the diseases to which they are liable, I have given a delineation of the whole in Plate XII. fig. 1.

Being now prepared to enter on the consideration of the diseases of these parts, I shall proceed accordingly to this part of our subject.

Inflammation of the eye frequently occurs, and is productive of many other diseases to which this organ is liable: I shall therefore enter first on the consideration of this symptom, and shall afterwards treat of the following diseases and operations peculiar to these parts: Wounds of the eyelids and eyeballs,—Tumors of the eyelids, such as abscesses, melicerous and steatomatous collections and warts,—Inversion of the cilia or eyelashes,—Everision of the eyelids,—Concretion of the eyelids,—Fleshy excrescences on the cornea,—Abscesses in the globe of the eye,—Dropical swellings of the eyeball,—Blood effused in one or both chambers of the eye,—Ulcers on the cornea,—

Specks

Specks or films on the transparent part of the eye,—Protrusion of the globe of the eye from the socket,—Cancerous affections of the eye, and extirpation of the eyeball,—Of artificial eyes,—Of cataracts, and the means of removing them by depression and extraction,—Obliteration of the pupil, by concretion of its sides and adhesion of the iris to the capsule of the crystalline and vitreous humours,—And, lastly, of the fistula lachrymalis.

SECTION II.

Of Ophtbalmia, or Inflammation of the Eyes.

THE eyes and their appendages, like every organised part of the body, are liable to inflammation; and the symptoms which it excites vary according to the particular seat of the disease. Thus the symptoms arising from inflammation of the retina and other deep-seated parts, are different from those which proceed from inflammation of the external coverings of the eye; and these again are different from those which arise from an inflamed state of the eyelids.

The most frequent symptoms attending inflammation of the eyeball, are, a preternatural redness of the adnata, owing to a turgescient state of the bloodvessels; pain and heat over the whole surface of the eye, attended with a sensation of motes or extraneous bodies rubbing upon
the

the eyeball, and in most instances a plentiful effusion of tears. All these symptoms are increased by motion of the eye or of its coverings, and likewise by exposure to light. We judge too of the depth of the inflammation by the degree of pain which exposure to light excites. When the pain induced by light is severe, there is always cause to suspect that the parts at the bottom of the eye, are inflamed ; and again, when the pain is trifling ; we conclude that the inflammation is confined to the external parts of the eye. We also find, when the inflammation is superficial, that the symptoms are in general local, and confined entirely to the eye ; but, when more deeply seated, severe shooting pains are frequently felt through the head, and fever very commonly prevails.

During the whole course of the inflammation, there is for the most part a plentiful flow of tears, which frequently become so hot and acrid as to excoriate the neighbouring parts ; but it often happens that, together with the tears, a consider-

able quantity of yellow purulent-like matter is discharged ; and, when the inflammation has either spread to the eyelids, or has been seated there from the beginning, as soon as the tarfi become inflamed, a discharge takes place of a viscid glutinous kind of matter, which adds greatly to the patient's distress, as it tends to increase the inflammation, by cementing the eyelids so firmly together, as to render it difficult, particularly in the mornings, to open them.

These are the appearances of inflamed eyes in the first stages of the disease ; but when of long duration, it proceeds, like inflammation of other parts, to terminate either in suppuration, or in the effusion of a fluid not convertible into pus. Inflammation of the eyes has also been known to terminate in mortification ; but this is a rare occurrence ; and we even know that it does not readily end in suppuration.

Inflammation of the eyes is induced by various causes : Whatever tends to produce inflammation in other parts, will be attended

attended with similar effects, when applied to the eye ; but the peculiar mechanism of this organ renders it liable to be acted on by causes which may with impunity be applied to other parts of the body. Thus, much exposure to smoke tends often to induce inflammation of the eyes : And it also happens from the application of much light ; particularly from much exposure to the rays of the sun ; to the influence of a large fire ; or to the effects of snow : And the introduction of lime, sand, or any other extraneous body, between the eyelids and the eye, is very universally attended with this effect.

The consequences, however, of these causes, are not in general permanent ; for, in recent cases, a removal of the cause is, in most instances, attended with the cure of the disease. It is that variety of inflammation which originates from disease of the system that proves most obstinate, and which is, therefore, most to be dreaded, particularly that which occurs from scrofula and lues venerea ; for we find by

B 4 experience,

experience, that few symptoms in either of these diseases prove ever so tedious as those inflammatory affections of the eyes with which they are often attended. Whilst a venereal or scrofulous affection subsists, it is in vain to expect a cure of any inflammation that may exist. Such remedies ought, therefore, to be employed as are known to prove most powerful for the removal of the disease of the system, at the same time that we attend to the local treatment of the eyes. It is the management of this local affection that we are now to consider.

In the treatment of inflamed eyes, the indications to be kept in view are, To remove any extraneous substances that might tend to excite irritation,—To diminish pain and irritability already induced,—To remove the turgescence of the blood-vessels of the eyes,—And to prevent a return of the disease.

When inflammation is induced by sand, or any other extraneous body acting on the eye, nothing will prove materially useful,

ful, till the cause of irritation is removed. With due pains, the eyelids may be so far separated with the fingers alone, as to admit of a clear view being obtained of a considerable portion of the eyeball. But this will be more effectually done, if an assistant, either with his fingers alone, or by means of a flat curved hook, such as is represented in Plate XIII. fig. 6. raises the upper eyelid, while the surgeon himself depresses the other. Any extraneous body discovered in this manner, may be taken out with the end of a blunt probe, covered with a bit of soft linen or silk; or, if any sharp-pointed substance is fixed in the eye, it will be most easily removed with small forceps.

It often happens, however, even when we are certain, from the feelings of the patient, as well as from other circumstances, that the inflammation is kept up by some cause of this kind, that nothing is discovered on inspection. In such circumstances, some advantage is often derived from injecting tepid water, or milk
and

and water, between the eyelids and eyes, by which sand and dust are often washed out, when they cannot be removed in any other manner: The easiest and most effectual method of throwing in these liquids, is by means of a bag of elastic gum, fitted with a short ivory pipe. With this bag, a surgeon can easily perform all that is necessary without assistance, which with a common syringe he cannot so readily do. One of these bags, properly mounted, is represented in Plate : XIII. fig. 3.

In this manner, and by bathing the eyes frequently in warm water, they may, in general, be entirely cleared of all extraneous bodies: But, when the inflammation has subsisted for some time, it often continues after the cause by which it was produced is removed; in which event, other remedies must be employed. When the pain is considerable, and the pulse quick, full, or hard, it becomes necessary to take blood in proportion to the strength of the patient. The bowels should be kept

kept open with brisk purgatives ; a low diet should be continued for a length of time, proportioned to the violence of the disease ; the body should be kept cool ; light should be excluded from the eyes, and they should be constantly covered either with soft linen soaked in a weak saturnine solution, or with cataplasms applied cold, composed of this solution and crum of bread. In this manner, very severe degrees of inflammation are often removed ; but cases frequently occur, which resist these and all the remedies usually employed.

In such instances, we find, that discharging blood from the contiguous parts, or even from the bloodvessels of the eye itself, proves sometimes useful, when all other means have failed. When a large quantity of blood is to be discharged, it is done with most advantage from the jugular veins or temporal arteries ; even the last of which, as I have already endeavoured to show, may be opened with entire

ture safety *. In advising local blood-letting, we do it either from the parts contiguous to the eyes, or from the vessels of the eyes themselves; and the means we employ for it are, cupping and scarifying the temples, leeches applied as near as possible to the eyes, and scarifying the bloodvessels of the eyeball or eyelids. The operation of cupping and scarifying, and likewise the method of applying leeches, have been already described †.

In a great proportion of cases, an early and a plentiful discharge of blood from the temporal artery or jugular vein proves successful; but, where ophthalmia is either deep seated, or of long duration, I have commonly found, that little advantage is derived from our taking blood in this manner, and that no remedy answers so well as a free discharge of blood from the vessels of the inflamed eye. As this operation, however, the division of the bloodvessels of the eye, has always been considered

* Vide Chapter VIII. Sect. 8.

† Vide Vol. IV. Chap. VIII.

considered as nice and hazardous, it has seldom been practised ; but any surgeon with a steady hand may perform it with safety, and without injuring the eye itself.

Various methods have been proposed for dividing the vessels of inflamed eyes. It has been attempted with a brush composed of the beards of barley ; by drawing the sharp spiculæ across the part to be scarified, a number of vessels are thus penetrated and divided. This was first put in practice by an English oculist, Mr Woolhouse, about the beginning of this century, and it was considered as an improvement on the means which till then had been in use for the same purpose, from the days of Hippocrates and Celsus ; which were, rubbing the parts to be scarified either with a piece of rough pumice-stone, or with the spiculæ of thistles, till the blood-vessels were sufficiently lacerated for discharging as much blood as was necessary. It has likewise been proposed to raise or elevate the vessels to be divided with

with the point of a needle, and then, with scissars or a scalpel, to cut them across.

All these modes, however, of scarifying the eye, proceed from timidity ; they give much unnecessary pain, and they do not answer so well as scarifications made with a sharp cutting instrument. Practitioners have commonly been afraid of attempting this operation with an instrument of this kind ; but any person accustomed to surgical practice, will find that it may be done both with ease and safety. In the hands of a steady surgeon, it may be done with the shoulder of a common lancet ; but, with a view to prevent the eyelids from being injured by one edge of the instrument, while the eye is scarified with the other, I have delineated a small knife in Plate XII. fig. 4. and another in Plate XXIII. fig. 5. with either of which the operation may be done with safety.

In this operation, two assistants are necessary, one to stand behind the patient, to support his head, and the other to secure

cure

cure his hands. This being done, the surgeon, standing or sitting before the patient, with the fore and middle finger of one hand should separate the eyelids, so as to expose as much of the eyeball as possible; whilst, with the instruments I have mentioned in the other, all the turgid bloodvessels should be divided. This is most effectually done by passing the point of the instrument below the enlarged bloodvessels, and thus cutting them from below upwards. In general, we wish to avoid the transparent cornea in this operation, and to confine the scarifications to the albuginea or cornea opaca; but when the vessels of the transparent cornea are much distended, they may be divided with ease and safety. I have often found it necessary, to divide the vessels of this part of the eye, and no inconvenience ever ensued from it.

On the inflamed bloodvessels being cut, we should endeavour to promote a discharge of their contents; for which purpose nothing answers so well as bathing the eye
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in warm water, either by means of an eye-cup, or with pieces of soft old linen, frequently immersed in the water.

A plentiful discharge of blood from the vessels of the eye often gives more relief in the pain arising from ophthalmia, than any other remedy we employ. But when it either does not succeed, or when not agreed to by the patient, opiates applied to the eye frequently answer. A few drops of a strong solution of opium in water being dropped into the eye, prove sometimes successful; but the common laudanum of the dispensatories, particularly when wine is employed as the menstruum, proves often effectual when the watery solution of opium has been used in vain

The pain arising from ophthalmia, as well as every other symptom which it excites, is frequently relieved by shaving the head, and washing it from time to time in cold water. Blisters applied behind the ears, on the neck and temples, are in some instances used with advantage; also
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drains, formed either by pea-issues, or with a cord in the nape of the neck.

In some stages of the disease, much distress is experienced from a thick viscid secretion, that glues the eyelids together. This takes place in some degree in almost every case of ophthalmia, particularly in the mornings, and when the *tarsi* or extreme borders of the eyelids are much inflamed. In this case, indeed, the inflammation soon terminates in a number of small ulcerations, which frequently may be distinctly seen round the whole circumference of the cartilaginous border of the eyelids.—From these this glutinous matter, which in some measure is produced by the sebaceous glands of these parts, is poured out in great quantities; and unless some means are employed for curing the ulcers, scarcely any remedy will remove the inflammation of the eyes.

A small portion of any emollient ointment, being from time to time inserted between the eyelids, proves often use-

ful in preventing this viscid matter from fixing them together; but the relief obtained in this manner proves only temporary. Some addition must be made to the emollient for the purpose of healing the ulcers from whence the matter is discharged, otherwise no permanent advantage ensues from it; and when the disease is local, and not connected with scrofula, the cure of the ulcers will commonly be followed by the cure of the inflammation by which they were produced. With this view, the calx of zinc, or *lapis calaminaris* finely levigated, may be added to an equal quantity of an emollient ointment composed of wax and oil; but no application proves so generally useful as ointments of the mercurial kind; and perhaps the best of these is the *unguentum citrinum* of the Edinburgh Dispensatory, mixed with an equal quantity of hogs-lard, and made soft with oil; or the blue mercurial ointment of different dispensaries, prepared with quicksilver and lard. One ounce of quicksilver,

quicksilver, triturated with four ounces of lard, is, for this purpose, a very useful remedy. Every night and morning the ulceration on the eyelids should be covered with a little of this, at the same time that a small portion of the ointment should be inserted between the upper and under eyelids, while a weak saturnine or vitriolic solution should be employed once or twice daily, as a wash.

It is almost unnecessary to remark, that no light should be admitted to the eyes, not merely while they continue inflamed, but as long as it excites pain: Even when one eye only is inflamed, care should be taken to keep them both covered; for we know from observation, that the exposure even of a sound eye to light, while the other is inflamed, almost constantly proves hurtful to both.

The eyes, however, should never be kept closely tied down: By keeping them too warm, much harm is often done. They should be lightly covered with a loose bandage either of silk or soft linen;

nen; and when the patient is able to go abroad before his eyes can bear much light, the bandage in Plate XIII. fig. 1. may be used with advantage: By means of it, the quantity of light admitted to the eyes is easily regulated, whilst the eyes themselves are neither compressed nor kept too warm.

By due perseverance in this kind of course, local inflammation of the eyes is in most instances removed; but where it proceeds from, or is connected with, scrofula or lues venerea, no remedy will prove successful, till the disease of the system is removed.

With a view to prevent those frequent returns of ophthalmia to which many are liable, various remedies have been recommended, particularly astringent lotions. They seldom, however, answer any good purpose; and when too strong, they are very apt to do harm. During the continuance of inflammation, we often derive advantage from bathing the eyes with weak solutions of sugar of lead,
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or white vitriol ; but they have no effect in preventing a return of inflammation. For this purpose, nothing that I have ever employed proves so certainly useful as cold bathing. By keeping the head shaved, and immersing it daily in cold water, much may be done in preventing those frequent returns of inflamed eyes, to which many are liable. For the purpose of applying local bathing to the eyes, different means are employed ; but the most simple and most effectual is by means of a cup, represented in Plate XIII. fig. 2. This cup, which should be of an oval form, and somewhat larger than the eye, being filled with water, or any other liquid, and applied to the eye, if in this situation the eyelids are opened and moved about, the whole surface of the eye will be thus effectually bathed. As a preventative of ophthalmia, a liberal use of 'Jesuits' bark has also proved useful ; and we know from experience, that in periodical returns of the disease, it is almost the only remedy on which we have to de-

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pend. I need scarcely observe, too, when any cause is discovered by which inflammation appears to be excited, or kept up, that it ought to be avoided; for if this precaution is neglected, no remedy will answer.

S E C-

SECTION III.

Of Wounds of the Eyelids and Eyeball.

AS the cure of wounds has already been treated of in Chapter II., it may be considered as out of place to enter upon any part of the subject again ; but I judged it proper to reserve for this place a more particular consideration of wounds of the eyelids and eyeball.

In wounds of the eyelids, the parts may be divided either in a longitudinal or transverse direction with respect to the course of their muscular fibres. If the skin only is divided, or, if a wound penetrating the whole substance of the eyelid, is inflicted in such a manner as merely to separate the fibres of the orbicularis muscle from one another, all that we have to do is to draw the skin and other divided parts exactly together, and to re-

tain them in this situation with slips of adhesive plaster. As in such circumstances no retraction can take place of the divided parts, they are easily retained; and care should be taken that they are kept in this situation till they unite.

But when the orbicularis muscle is cut transversely, especially when a corresponding part of the tarsus or cartilaginous border of the eyelid is likewise cut, more care is requisite. If they are allowed to separate much, such a want of tone in the eyelid is apt to take place, as serves to interrupt its usual motions: And again, if the divided parts are drawn too tightly together, they impede the motion of the eyeball.

In transverse wounds of the eyelids, it is sometimes necessary to employ sutures. The interrupted suture is usually preferred; but the twisted future answers better. The method of performing these futures having been described in Chap. VI., I have at present only to remark, that in the practice of either of them upon the
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the eyelids, much nicety and delicacy is required, otherwise much harm may be done, not only to the eyelids, but to the eye itself. When the twisted future is employed, the pins should be short and small, so as to run as little risk as possible of hurting the contiguous parts, and they should be made to pass not only through the skin, but into the fibres of the orbicularis muscle, otherwise little advantage will be gained by the operation: But they should not be carried entirely through the inner membrane of the eyelid. This would irritate and inflame the eye; and not being necessary, it ought to be avoided. If the skin is properly retained in its situation, with a few of the fibres of the muscle underneath, a better cure will be obtained than if the needles were made to pass through the whole substance of the eyelid; for in this manner the action of the muscle is preserved, whilst no risk is incurred of the eyelid being too much contracted; a circumstance very apt to occur

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occur when the whole thickness of the eyelid is penetrated by the futures.

It is almost unnecessary to observe, that in order to insure success from this operation, the motion of both eyes should be as much as possible prevented, otherwise no union of the divided parts will be obtained; the eye will be irritated; inflammation will occur; and this will render it necessary to remove the futures before they have effected the purpose for which they were employed.

On the futures being finished, the eyelids should be closed and covered with a pledget of lint or soft linen spread with saturnine cerate, that the parts may be kept as easy as possible; and a compress of lint being laid over it, and another over the sound eye, the whole should be retained by a napkin over the head, tied in such a manner as to press equally and gently upon both eyes. Inflammation should be strictly guarded against; or if it has already taken place, we must endeavour to remove it by the means pointed

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out in the last section ; and in the course of three days from the futures being inserted, they should all be removed ; for in this period, if the parts have been kept in contact, their union will be complete.

We have hitherto been supposing, that the parts are only simply divided ; and when replaced, that the eye is found to be as completely covered as before : But it sometimes happens, that they are not only divided but destroyed ; in which case, when such a portion of the eyelids is removed, as to prevent the parts that remain from being brought into contact without impeding the motion of the eye, it will be more prudent to leave them at some distance from each other ; and by treating them with light dressings, to trust to nature for supplying the deficiency, by a new production of cellular substance.

The mechanism of the eyelids is peculiarly adapted for the protection of the parts beneath from too free an admission of light, air, and dust ; but no possible structure could prevent them from suffering

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ing by injuries of a different kind : We accordingly find, that the eyeball is liable, like other parts of the body, to wounds, contusions, and other injuries.

As the bones at the bottom of the orbit are in some parts extremely thin, wounds of the eye which penetrate deep prove dangerous from the near contiguity of the brain : But superficial wounds, that penetrate only the anterior part of the eye, although they may destroy the beauty and utility of the organ, are not in other respects to be considered as hazardous. Wounds of this part, however, of whatever kind they may be, require at all times the greatest care and attention ; not only with a view to the preservation of sight, but in order to prevent or obviate the effects of inflammation, a symptom which they very commonly induce.

Wounds of the transparent cornea, when directly opposite to the pupil, most frequently induce either a total or partial loss of vision ; for the cicatrix that succeeds very commonly remains opaque during life :

life : But although in this respect wounds of the anterior part of the eye are always to be dreaded, they seldom inflame so much as wounds of equal extent in the sclerotica or opaque cornea, which are always more painful, and productive of more hazard.

In other parts of the body, a small punctured wound is more to be dreaded than an extensive cut ; but in the eye, the risk arising from wounds is most frequently in proportion to their extent ; a circumstance which with surgeons ought to have influence in the preference which they give to the different operations on the eyes : It is not the pain arising from these operations to which I allude, and which frequently occurs in a greater degree from punctures than from very extensive cuts ; but it is the risk induced by large wounds, of discharging the humours or contents of the eye, by which vision, if not entirely destroyed, seldom fails to be injured ; by which the eye is often so much diminished, as to sink almost to the bottom of the orbit :

orbit : I shall, however, when treating of cataract, have occasion to consider this subject more fully.

In the treatment of wounds of the eyeball, to prevent or remove inflammation should be considered as our most important object. When a wound in the eye is large, it is scarcely possible to prevent the humours from being discharged ; for the natural and usual action of the muscles necessarily forces them out. In this case, no benefit is derived from the skill of the practitioner, and the use of the eye is immediately lost : But for one eye that is destroyed in this manner, twenty are ruined by inflammation, either from its being so violent that no remedy can lessen or remove it, or from its being too easily treated at first, and allowed to proceed too far before the necessary remedies are employed : In every wound, therefore, of this organ, all those means should be immediately advised, which, by experience, we know to prove most effectual in the prevention of
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this symptom; but these having already been fully mentioned in Section II. of this Chapter, it is not necessary to enumerate them again.

In wounds of the eyeball, the structure of the parts renders it impossible to diminish the extent of the opening: The parts in this situation cannot, as in the eyelids, be placed in contact, and retained with sutures: Nothing of this kind being here admissible, all that art can attempt, is, together with a strict antiphlogistic regimen, to keep the eye lightly covered with a pledget of any emollient ointment; to bathe it from time to time with a weak solution of lead; and when the pain becomes severe, to give adequate doses of opium.

In extensive wounds of the eye, attended with an entire discharge of its contents, permanent blindness, with the usual deformity induced by the sinking of the eyeball, must necessarily succeed; but in wounds of lesser extent, we have it frequently

quently in our power, by due attention to the means that I have advised, to remove symptoms which otherwise might end in the greatest danger.

S E C-

SECTION IV.

Of Tumors of the Eyelids.

SMALL tumors occasionally form on the eyelids, which by impeding their motion, and rubbing on the globe of the eye, are apt to excite a great deal of distress.

The contents of these tumors are various, and of different degrees of firmness. Towards the internal angle of the eye, and most frequently on the under eyelid, near to the lachrymal punctum, small tumors are apt to form, chiefly of the inflammatory kind, and in this country commonly termed the *Stye* *. They begin with a sensation of fulness, stiffness, and uneasiness in the internal canthus of the eye. At first the skin is scarcely discoloured ; but if the tu-

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* This is a variety of the *Hordeolum* of Sauvages and other nosologists.

mor proceeds to suppuration, it becomes first of a pale red, and afterwards yellow, when it commonly bursts and discharges a thick purulent matter. The sty is a tumor altogether inflammatory, and should be considered indeed in no other light than a common boil or abscess. The only circumstances in which it differs from boils in other parts of the body, are, the colour of the skin not being of such a deep red at first, and its advancing more slowly to suppuration. This, however, proceeds evidently from the peculiarity of its situation ; for the matter being seated between the tarsus and internal membrane of the eyelid, the firmness of the cartilage prevents the skin which covers it from being much discoloured.

These are the tumors that prevail most frequently on the eyelids ; but they are also liable to others, in common with other parts of the body.

The first of these that I shall mention is commonly of a round form, and somewhat soft or compressible : It seems to move or
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roll when pressed upon ; the skin retains its natural appearance ; and from the contents of it when laid open being of a fatty nature, we term it a Steatoma. The soft white matter, of which these tumors are composed, is always surrounded with a firm membranous cyst.

Small tumors or excrescences form occasionally on different parts of the eyelids, in some instances, with narrow pendulous necks ; in others, with thin broad bases. Some, being of a soft fleshy consistence, are termed Sarcomatous tumors ; whilst others, being hard and firm, are denominated Verrucæ, or Warts.

In the treatment of the sty or small boil, so frequently met with near the internal angle of the eye, some doubt has arisen of the propriety of bringing them to suppuration ; and by many it is even said, that we should in perhaps every instance, by means of vitriolic and other astringent applications, attempt to remove them by resolution or discussion. Almost the only reason, however, that can be given for this

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is, the trouble of bringing them to suppuration : But on considering the advantage to be derived from it, and the hazard of injuring the eyelids, by frequently attempting to repel what nature means to discharge, we will not hesitate in the choice of our method of cure. By bringing these tumors to suppuration, we incur indeed some additional trouble ; but it is seldom considerable : And as soon as matter is fully formed, if it does not burst and discharge itself, opening the tumor with the point of a lancet procures complete relief, and the sore commonly heals quickly without further trouble.

As soon therefore as a sty is clearly formed, we should endeavour, by a frequent renewal of warm emollient poultices, to bring the tumor to suppurate, and then to discharge the matter with a lancet, if it does not previously burst of itself. I know from experience that the practice is perfectly safe ; that the pain attending it is inconsiderable, and that it tends to prevent these tumors from ending in others
of

of a more inveterate kind, which, in the usual method of treating them, is apt to happen. After this kind of boil has suppurated and discharged its contents, bathing the parts with a weak saturnine or vitriolic solution proves useful ; in the proportion of a grain of saccharum saturni, or vitriolum album, to each ounce of water : It tends to remove any uneasiness that remains, and to restore the parts to their usual tone.

All tumors of the eyelids of a firm consistence, whether steatomatous or warty, as they cannot be made to suppurate, should be removed by excision, as soon as they impede in any degree the motion of the eye. As long as they remain small, they are for the most part inoffensive, and are therefore overlooked ; but whenever they begin to increase, they should immediately be taken off.

In all warty excrescences of a small size, as well as in those of the sarcomatous kind, we are commonly advised to remove them with caustic ; or if the base is small, to do

it with a ligature. This, however, should never be done : No reason indeed can be given for it but timidity either on the part of the patient or of the operator : Whether we employ caustic or ligatures, the cure must prove tedious ; they commonly excite inflammation and irritability of the eye, and they frequently give more pain than is ever done by the scalpel : In the removal therefore of these tumors, we should trust solely to excision, an operation neither attended with difficulty nor hazard.

The patient being seated opposite to a window, and his head secured by an assistant, if the tumor cannot be laid hold of with the fingers, a ligature should either be passed round it, or pushed through it with a needle, in order to enable the operator to raise it by pulling it gently from the parts beneath ; and this being done, if its base is narrow, it may be removed at once ; but when extensively attached to the neighbouring parts, it is better by slow dissection to ensure its total removal, than by proceeding quickly to incur the
risk

risk of allowing part of it to remain, or to require further trouble afterwards in removing it. On the operation being finished, a piece of soft lint should be applied to the sore, and retained with a slip of adhesive plaster ; by which the sore very commonly heals easily, without further trouble.

When, again, the tumor is of the steatomatous or encysted kind, instead of dissecting it off covered with the skin that surrounds it, by which a troublesome unseemly cicatrix is always produced, it answers better merely to divide the skin by a simple incision with a small scalpel. This should be done from one end of the tumor along the most prominent part of it to the other ; and a strong waxed thread being passed through the centre of the cyst, this should be given to an assistant, in order to separate or raise it from the parts beneath, while the surgeon himself, with cautious dissection, endeavours to separate the skin and cellular substance ;

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and

and this being done, the tumor is easily removed by the ligature.

When, in the course of the operation, it has become necessary to divide the internal membrane of the eyelid, no dressing should be applied to the sore, as the most inoffensive we could employ would irritate and inflame the globe of the eye. All that, in such circumstances, should be done, is, to lay the lips of the sore as nearly together as possible ; and to remove as frequently as is necessary, any superfluous matter that may happen to form in it. But when it is found necessary to cut entirely through the eyelid, in order to render the cicatrix neat, the lips of the wound should be drawn together with the fingers, and retained with slips of adhesive plaster till they unite.

In the extirpation of these tumors, when the cyst is firm, and the contents of the steatomatous kind, the bag should be preserved entire, as in this state it is more easily and more effectually removed by doing so than in any other manner : But
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whenever the cyst is thin, and especially when the contents of it are fluid, it is commonly difficult, and in some instances impossible, to separate the teguments from it beneath, without laying it open. In this case, after dividing the skin and cellular substance, by making an incision along the most prominent part of the tumor, it is better to open the cyst at once by a large puncture with the point of a lancet, in order to discharge the matter contained in it, than to make any attempt, as is commonly done, to preserve it entire; by which, in such circumstances, the operation is always rendered more tedious than it otherwise might be.

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SECTION V.

Of Inversion of the Cilia, or Eyelashes.*

THE eyelashes are in some instances so much inverted, or turned inwards upon the eye, as to excite much pain, by rubbing or fretting the coats of it: In which case, it becomes necessary to remove them.

This inversion of the cilia is produced by different causes: In some cases, it proceeds from a derangement of the hairs themselves, which leaving their usual direction turn in towards the eyeball: But more frequently it is produced by a cause of a more distressful nature, an inversion of the tarsus or cartilaginous border of the eyelid: This again is most commonly induced either by an unequal spasmodic affection of the orbicularis muscle of the under eyelid; for it is not frequently met
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* The Trichiasis and Entropium of authors.

with in the upper palpebra : or it occurs as the effect of a cicatrix upon the skin of this part, the consequence of some previous injury : In some instances, it is produced by tumors, forcing the eyelashes in upon the eye ; and a relaxation of the external teguments of the eyelid has likewise been supposed to induce it. As the cause of the disease is various, so it is evident that the means of cure must likewise be so.

When it is found to originate solely from a derangement of the cilia themselves, without any inversion of the eyelids, we are directed by authors, in the first place, to pull out the inverted hairs with small pliers ; and to prevent them from growing again, we are desired to burn their roots either with lunar caustic, or with the end of a red-hot wire. Nay, some have proposed that the whole cartilaginous edge of the eyelid in which the hairs are placed, should be entirely destroyed with caustic.

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The pain and inflammation of the eye, induced by an inversion of the cilia, is in some instances indeed so distressful, and it is so difficult to prevent them from rubbing upon the eye, that none who have seen how obstinate they often are, will be surprised at the attention with which by many authors they have been considered : But it fortunately happens, that none of the painful remedies that I have mentioned are necessary ; for the same intention may in almost every instance be accomplished by means of a more simple nature.

When the eyelashes have remained long in a deranged state, and have acquired their full strength and elasticity, it is altogether impossible to bring them again into a proper direction. In such circumstances, therefore, they should all be pulled out by the roots ; for to cut them over, as is sometimes done, tends only to make them stronger and sharper than they were before. This being cautiously done with small forceps or pliers, relief is thus commonly obtained immediately : But unless
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we can prevent the new hairs from taking a similar direction, they very speedily advance so far as to induce a return of the disease. Nothing, however, can be done for this, till the new hairs have acquired some length ; but as soon as they are about half their usual length, and whilst they are yet more soft and pliable than they afterwards become, by turning them down upon the eyelid with the end of a blunt probe, and retaining them in this situation for two or three weeks, either by covering them with narrow slips of adhesive plaster, or with strong mucilage or glue by means of a small pencil, a complete cure may thus be commonly obtained. Much attention is necessary, indeed, in order to ensure success ; more, it must be acknowledged, than the disease commonly meets with : But due perseverance in the means I have mentioned, will in almost every instance answer ; and being an easy method of obtaining relief in a very painful affection, nothing should be omitted that can tend to

to render the practice of it frequent and more certain.

When, again, the disease appears to originate from an unequal spasmodic exertion of the orbicularis muscle of the eyelid, no danger can ensue from making a slight incision on the internal surface of the under palpebra, of such a depth as to divide those fibres of the muscle that appear to be contracted, and by which the inversion of the cilia is produced. The only inconvenience that this can produce, is some degree of stiffness or immobility in the under eyelid, but which could not, even in the worst degree of it, be of much importance: And as no other remedy could in this variety of the disease prove useful, we should not hesitate to advise it. If, then, those fibres of the muscle that appear to be preternaturally contracted are freely divided, a cure of the disease will be obtained, and the incision will readily heal, without any dressings being applied. In this situation, indeed, no dressing can with propriety be employed; but experience shews that it is
not

not necessary ; for a cut in this part commonly heals easily.

When the cilia are found to be pushed in upon the eye, either by a tumor or cicatrix of some old sore, no cure can be obtained till the cause is removed. When produced by a tumor, this must be extirpated in the manner pointed out in the last section ; and when an old cicatrix falls to be removed, we do it by making an incision with a scalpel so as to surround the whole of it, and afterwards in a slow cautious manner dissect it off.—When the pressure produced by the cicatrix has been the sole cause of the cartilage being turned inwards, the removal of the cicatrix will in general remove the disease ; and in this case the sore may be healed in the usual manner with easy dressings. But when it is found that the direction of the cilia is not immediately altered upon the cicatrix being removed, the lips of the sore should be drawn together, so as to bring the edges of the divided skin into contact ; and in this state they should be
secured

secured either with slips of adhesive plaster; or when this does not answer, it may be done either by the twisted or interrupted futures: By which means the points of the eyelashes may be turned entirely outwards, so as to accomplish in the most complete manner the intention of the operation.

It has also been supposed, as I have already remarked, that this disease may be produced by the external skin of the eyelid being too much relaxed. This, however, is what I never met with; and as we cannot suppose that these parts are retained in their situation by any exertion of the skin alone, it is not probable that any relaxation to which it is liable can have much influence in giving them a wrong direction; but if the contrary should ever be the case, the remedy to be employed is obvious: If the disease is of short duration, and the relaxation and loss of tone in the skin not considerable, bathing the parts frequently with a strong solution of alum in an infusion of oak-bark,

bark, or with any other astringent, may lessen or remove it ; but when this does not answer, our only resource is to remove all the relaxed skin with a scalpel : This being done, we draw the edges of the cut together, and retain them till they unite, either with adhesive plasters, or futures, in the manner already pointed out.

An inversion of the cilia constantly excites, as I have already observed, inflammation of the eyeball : This symptom, however, commonly subsides on the hairs being removed ; but when this does not happen, those means must be employed which usually answer best for the removal of inflammation of the eyes, by whatever cause it may be induced. These having been enumerated in Section II. of this Chapter, it is not necessary to speak of them here.

I have already observed, that the inversion of the cilia occurs most frequently in the under eyelid. In some instances, however, we meet with it in the upper pal-

pebræ ; and in such cases it is scarcely necessary to remark, that the disease being exactly similar both in its causes and effects, the means employed for removing it should be the same. In the upper eyelid, a swelling occasionally occurs over the whole of it, by which the usual and natural exertion of its muscles is either much impeded, or perhaps entirely interrupted, and by which, too, the eyelashes may be so far inverted, as to produce this disease. In such cases, as the swelling of the eyelid is commonly of the dropical kind, it is more readily removed by two or three small punctures with the point of a lancet than by any other means : But when this does not prove sufficient, if it appears to be perfectly local, and not connected with an anasarcaous swelling over the rest of the body, rather than allow vision to be much interrupted by a continuance of the swelling, it has been proposed to cut out a segment of the most prominent part of the skin, to discharge any water that may be contained in it,
and

and to reunite the divided edges of the fore with futures. Nay, much time and ingenuity has been employed in the invention of instruments for effecting this operation neatly, and without much loss of blood ; an occurrence, which in former times was always much dreaded. This should indeed be guarded against as far as is necessary ; but in the operation of which we are speaking, it can never require much attention, for none of the blood-vessels in those parts are of a size that can render it dangerous to divide them.

The instrument to which I allude acted solely by pressure : All the skin meant to be removed being included between two thin plates of brass or steel, a degree of pressure sufficient to destroy the circulation in the contained parts was applied and continued by means of a screw till the whole dropped off ; but as the operation may be both more neatly and more speedily done with a scalpel, it ought in every instance to be preferred. In what-

ever way it is done, as much of the skin should be removed as appears to be superfluous. If the edges of the sore, on being brought together, can be retained with adhesive plaster, it ought to be done; but when plasters do not answer, we have recourse to the interrupted future.

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SECTION VI.

Of the Gaping or turning Outwards of the Eyelids.

THIS deformity is produced by the internal surface of one or both of the eyelids being turned outwards so as to fold over some part of the cilia and contiguous skin: By nosologists it is in general termed Ectropium; and Lagophthalmus when in the upper eyelid only, from the resemblance which it is supposed to bear to the eye of a hare.

Every degree of this affection occasions deformity; so that even in this view it merits attention: But in its more advanced stages it frequently gives much distress, by leaving a considerable part of the eye uncovered.

The internal membrane of the eyelids may be turned outwards by various causes:

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Tumors

Tumors of whatever nature they may be when seated within the orbit, sometimes produce it : It is also induced by dropfical effusions in the cellular substance that covers it ; and likewise by inflammation of the same part. Relaxation, induced either by an inflamed state of this part, by a previous dropfical swelling, or merely as a consequence of old age, excites the most obstinate kind of it : And lastly, we find it often induced by the cicatrix of a wound or abscess, when so situated as to corrugate or contract the skin of either of the eyelids. In the method of cure it is evident, that due attention becomes necessary to the particular cause by which it is produced.

When tumors are discovered to be the cause, they must be removed in the manner pointed out in Section IV. of this Chapter. When they appear to be dropfical, connected with general anasarca, if the disease of the system is carried off, this particular symptom will most frequently vanish also ; but when it appears
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to be local, as in some instances is the case, no dependence is to be placed on medicines: In this case, the effused fluid should be discharged either by punctures or scarifications, not made through the external coverings of the eyelids, but directly into that part of the internal membrane that is protruded by the water collected within it. Small punctures should be first advised with the point of a lancet; and if these fail, scarifications should be made with one or other of the instruments delineated in Plate XII. fig. 4. or in Plate XXIII. fig. 5. all along the course of the swelling; and being carried to a sufficient depth, they will not only discharge the effused water, but the inflammation which they excite will tend to prevent it from collecting again: After the water is discharged, and any inflammation induced by the operation is gone, the parts should be frequently bathed with a weak solution of white vitriol, or any other astringent collyrium.

In cases of ectropium induced by inflammation, our means of cure should be chiefly directed to the removal of this symptom; and, for the most part, when not long neglected, or not particularly obstinate, the protrusion will subside on the inflammation being removed. But when the inflammation has subsisted long, the protrusion often continues fixed and permanent long after the cause that gave rise to it is gone: Whenever the disease therefore depends upon this cause, we should endeavour by the most active remedies to have it speedily carried off. In Section II. of this Chapter, these have been fully enumerated: I have now therefore only to remark, in addition to the means that were there pointed out, that deep scarifications into the inflamed membrane itself prove here particularly useful. The vessels of the protruded membrane are in this state of the disease commonly so turgid as to give it a considerable degree of preternatural thickness: If this increase of bulk be not removed, no cure
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can take place; and nothing tends with such certainty to accomplish this, as unloading the inflamed vessels of their contents; which we do in the most effectual manner by deep scarifications.

When, again, the disease occurs from relaxation, as is often the case in advanced stages of life, no chirurgical operation should be advised. In this situation we trust altogether to palliatives. The patient should be desired to bathe his eyes daily in cold water, or in water mixed with a small proportion of brandy; or, he may use a weak astringent collyrium of vitriolum album and saccharum saturni dissolved in water. In this manner, he may prevent the disease from advancing farther, and in some instances may even be able to remove it. But whether this should be the case or not, when it is evidently the effect of old age, nothing very severe in its operation should ever be advised.

The most distressful, and perhaps the most frequent cause of ectropium, is the
cicatrices

cicatrices of sores, abscesses, and the confluent small pox, when so situated as to contract the skin of either of the eyelids. A cicatrix may be so situated, as we have seen in the last section, as to produce an inversion of the cilia. Of this I have met with different instances, but it more frequently happens, that the disease we are now considering is induced by it.

As the disease is here evidently induced by a preternatural contraction of the skin connected with the eyelid, nothing can accomplish a cure but the division of such parts of the skin as are thus morbidly drawn together. For this purpose, the operator, by an attentive examination of the parts affected, should render himself perfectly certain of the full extent of the disease; and this being done, an incision should be made directly across that part of the skin which appears to be contracted, and carried freely into the cellular substance by which the skin is connected to the parts beneath. When the contraction

contraction takes place at one point only, a free division of the skin at this part will be sufficient; but it commonly happens, that the skin is fixed to the parts beneath over the whole course of the cicatrix; in which event, a small incision, in the manner I have mentioned, and with which operators in general rest satisfied, will have little or no effect in removing the disease.

In this case, after making an incision through the teguments from one end of the cicatrix to the other, the edge of the divided skin should be raised with the assistance of dissecting forceps, and the whole of it should be separated and removed with the scalpel from the parts to which it adheres. If this is properly done, that part of the eyelid, that was turned outwards, will either return of itself to its natural situation, or it may be easily replaced by the operator; and this being done, the rest of the cure must consist in such an application of a bandage, or of slips of adhesive plaster, as will retain

tain the skin, till by the formation of granulations at the bottom of the sore, any farther contraction may be prevented. To give directions for the application of bandages is unnecessary, as it must always depend on the ingenuity of the operator. In general, however, I may remark, that when slips of adhesive plaster can be made to answer the purpose of bandages, they ought to be preferred for parts contiguous to the eyes, where bandages can never be applied with such tightness as to retain the dressings, without injuring the parts beneath.

SECTION VII.

Of Concretion of the Eyelids.

IT has long been known, that any two parts of an animal body being kept in contact when inflamed, very readily unite together; a fact that accounts for many phenomena, and among others for those adhesions of the eyelids that sometimes succeed to an inflamed state of these parts. Inflammation of the eyelids, when of long duration, frequently forms partial adhesions, not only of the eyelids to each other, but to different parts of the eye itself: To slight degrees of this, a patient will commonly rather submit, than undergo the pain and terror of an operation; but when the adhesions are so considerable as to impede the motion of the eyelids, and thus to obstruct vision, it becomes necessary to employ the most effectual means
for

for relief. It sometimes happens, too, that the eyelids adhere together at birth, of which I have met with different instances.

When the adhesion is slight, and not of long duration, it may in general be removed by separating those parts of the eyelids that adhere, with the end of a blunt probe passed behind them; but when they adhere either firmly to each other, or to the eyeball, a cure can be effected by dissection only. In performing this operation, the patient's head should be firmly secured by an assistant, who should likewise endeavour to support or elevate the upper eyelid, whilst the surgeon, with small forceps in one hand, should raise or separate the under palpebra, and at the same time should proceed to divide with a scalpel in the other, every fibre by which the adhesion is produced. In every part of the operation, much steadiness is required; particularly where any part of the palpebræ adheres to the eyeball.

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When the cause of adhesion is thus completely removed, as the dressings usually applied to fores cannot with propriety be used here, all that we should attempt, is to cover the eye with soft lint spread with Goulard's cerate, or any other emollient ointment; and after the first dressing, a small portion of the same ointment, perhaps the size of a pea, may be daily insinuated between the eyelids: By this means the sore is kept soft and easy, at the same time that the usual motion of the eyelids prevents every risk of new adhesions between the parts newly divided. In this, however, as well as in every operation upon the eye, the structure of which is so delicate as to render it very susceptible of inflammation, much attention is necessary to prevent this symptom, and to remove it when it has actually taken place.

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SECTION VIII.

Of Fleshy Excrescences on the Cornea.

EYES that have been liable to repeated attacks of inflammation, are apt to have a membranous substance form on some part of the opaque cornea: This, in some instances, continues of a small size, and does not produce much inconvenience, while in others it extends so as to form a ring round the whole tunica conjunctiva, and even spreads to such an extent as to cover not only all the opaque cornea, but even the transparent part of the eye.

Being supposed to resemble a fowl's wing, it has by some been termed Pterygium, and by others Onyx, from its resemblance to the nail of a finger: It begins most frequently near the internal angle of the eye; but in some we first perceive

ceive it on the most prominent part of the tunica albuginea.

In some instances of severe inflammation, a tough yellow-coloured membranous substance forms and spreads over the whole eyeball : This, however, is perfectly inorganic, and is evidently of the same nature with those crusts or exudations so frequently met with in parts recently inflamed : But the disease we are now considering consists of an organic membranous substance, that is equally irritable with other parts of the body, and which, when wounded, discharges blood freely. It is indeed so clearly vascular, as to render it probable that it consists entirely of a congeries of small blood-vessels, which being once forced out from any point of the ball of the eye, either as a consequence of external violence or of inflammation from any other cause, we can easily suppose that every fresh attack of inflammation will cause them pullulate or shoot out in a degree somewhat

proportioned to the violence of the cause by which it is produced.

In some instances, this production does not appear till the violence of the inflammation is over: In which case, it is not accompanied with pain, unless when some cause of irritation is applied to it; but in others it takes place during the continuance of inflammation, when the pain attending it is always severe. During this inflammatory state of the disease, this membrane is in general of a deep red colour; but when the inflammation subsides, it becomes pale and somewhat yellow.

As long as this kind of excrescence continues of a moderate size, and does not impede the motion of the eyelids, nor obstruct vision, all we ought to do is, by means of gentle astringents, to endeavour to prevent its increase. In section II. of this chapter, I have said all that appears to be necessary on the subject of inflammation. I shall now therefore suppose that the inflammatory symptoms are,
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by the means which were then pointed out, either removed or much mitigated, and that our attention is now to be directed to the removal of this preternatural membranous production. In this state of the disease, astringent applications, as I have observed above, ought to be alone depended on as long as the size of the excrescence is inconsiderable. A weak solution of corrosive sublimate, in the proportion of a grain to four ounces of water, has sometimes proved useful; but in general, nothing answers either with such certainty or safety as white vitriol, or alum, dissolved in water, care being taken to have the solution of such a strength as the eye can easily bear. A scruple of white vitriol, or half a drachm of alum, to four ounces of water, will in general prove sufficiently strong: but in every case, the strength of the remedy ought to depend on the feelings of the patient; for with some it may be employed of double the strength which others can bear.

A proper use of escharotic powders has also proved useful here ; but in this form, escharotics require to be used with much caution. Calcined alum in fine powder, a small proportion of white vitriol, or of verdegris, mixed with a sufficient quantity of white sugar, or any other powder of a mild nature, may all be used for this purpose. A small quantity of any of these may be sprinkled upon the diseased part once or twice daily, and repeated as long as any benefit is derived from them ; or the use of the powders may be alternated with that of the wash in the manner I have mentioned.

A due perseverance in the use of these remedies will very commonly retard, as I have observed above, the progress of the excrescence ; but when it proves otherwise, and when it proceeds so far as to cover any part of the transparent cornea, as this might soon be attended with a total loss of sight, other means should be employed.

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As our object here is to remove the excrescence entirely, the scalpel alone is to be trusted. Authors, who have written on this subject, describe an operation for the purpose of removing membranes of this kind by dissection. When the excrescence is loose through a considerable part of its extent, and attached to the eye by a small pedicle only, it may be removed with safety and expedition with a scalpel; and in such cases, this method should be preferred to every other. But whenever it adheres to the eye over its whole surface, to remove it by dissection is both difficult and hazardous; and as the same intention may be carried into effect by more gentle means, these ought to be adopted.

This excrescence is very commonly seated, as I have already observed, upon some part of the tunica conjunctiva, and approaches in a gradual manner towards the centre of the eye: We have likewise seen that it consists almost entirely of an extension or elongation of a number of small bloodvessels: Hence we may con-

clude, that nothing will tend with more certainty to remove it, than the destruction or division of those vessels by which it is produced : And accordingly I have in various instances been able to complete the cure of such affections by these means alone ; and as the operation for this purpose, with those accustomed to perform it, is neither attended with difficulty nor danger, it ought always to be done as soon as the disease is found to resist the means usually employed for it.

The method of performing it is this : The patient being placed upon a pillow on the floor, the surgeon, sitting behind on a chair, should cause him incline his head backwards upon his knees, with his face raised in such a manner that a sufficient degree of light may fall directly upon his eyes. This being done, and the patient's hands properly secured, the under eyelid should be drawn down by an assistant, while the upper palpebra is supported in such a manner by the left hand of the surgeon, as to expose to view the full extent
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of the disease on the eyeball. With the knife, *fig. 4. Plate XII.*, he is now to make scarifications through the full thickness of the excrescence, near to, and entirely round, its external circumference, so as to cut off all communication between the roots and extremities of those vessels of which it is formed. This may either be done by one continued stroke of the scalpel, or with repeated smaller scarifications; and in order to render the success of the operation more certain, by a free division being made of every bloodvessel connected with the excrescence, after the discharge of blood induced by the first incisions is abated, one, two, or more circular scarifications may be made within one another, in such a manner as that the last may be contiguous to the centre of the excrescence.

In making these scarifications, it is necessary to avoid the eyeball; for which reason, it is better to do the incisions by repeated strokes, than to go to the full depth of the excrescence at once; but it

may be done with much more ease in the manner I have mentioned, than by lifting the excrescence with a needle and ligature before dividing it; for we may just as readily injure the coats of the eye with the needle as with a scalpel. This method of elevating the parts to be divided by means of a ligature, is much recommended by some practitioners; but I know from experience, that the operation may be performed with more ease in the manner I have pointed out.

After as many incisions have been made as appear to be necessary, the parts may be allowed to bleed freely, and may be afterwards bathed two or three times daily with a weak solution of saccharum saturni. The incisions may also be repeated in a similar manner, if, in the course of a few days, the excrescence does not begin to diminish; and the same operation may be renewed with safety from time to time, as long as any part of the disease is found to remain.

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When, again, any portion of the excrescence is observed to become more loose in its connection with the eye, either in consequence of the number of incisions made in it, or of the suppuration which commonly ensues from this operation, it ought immediately to be removed with the scalpel: but when this does not happen, and when every part of it continues still to adhere firmly to the eye, no attempt should be made to remove it.

When a cure can be effected by any means hitherto known, the plan that I have mentioned will more readily answer than any other; and being attended with no hazard to the eye, it ought to be preferred. But it is necessary to remark, that although this operation very commonly succeeds, yet instances sometimes occur, in which no advantage is derived from it, and in which scarifications made in the excrescence, or any other operation performed on it, instead of proving useful, is regularly attended with an increase of the disease. This being the case, the operation I
have

have described should not be persisted in. In such circumstances, a palliative course ought alone to be kept in view. No remedy with which we are acquainted, will in this state remove the disease, but it may commonly be prevented from acquiring any additional increase; and the symptoms induced by it may be kept moderate, by the eye being frequently bathed with a weak saturnine solution, and by keeping it covered with pledgets of Goulard's cerate, or any other similar application.

When it is found, however, that the disease does not yield to any of the remedies I have mentioned, and if the excrescence still proceeds to acquire an additional bulk; so as entirely to destroy vision, and to excite severe pain, as this will give much cause to suspect that it may degenerate into cancer, it ought at once to be removed by extirpating the eyeball. The remedy is no doubt severe: But in circumstances such as we are describing, as the use of the eye is supposed to be irrecoverably

coverably lost ; and as the patient's life might be endangered by the contiguous sound parts being allowed to remain long in contact with those that are diseased ; no doubt should be entertained of the propriety of removing them. The method of performing this operation will be the subject of one of the following sections.

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SECTION IX.

Of Abscesses in the Globe of the Eye.

INFLAMMATION of the eyes is by experience known to terminate most frequently by resolution; that is, the pain and tension abate, and the redness and fulness of the vessels are dissipated, without any marks being left of their having ever existed. Instances, however, occur of inflammation of the eye ending in the formation of matter; in some cases, from those means being omitted at first which most certainly tend to remove inflammation; and in others, from the patient being of a scrofulous habit or otherwise diseased.

When the internal surface of the coat of the eye has been long inflamed, it sometimes yields a purulent-like matter, which being poured into one or other of the chambers of the eye, is soon diffused over
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all the aqueous humour ; by which the ball of the eye not only becomes enlarged, but vision is either in a great measure or perhaps entirely destroyed ; the appearance of the eye is much changed ; and neither the iris, pupil or crystalline, can be distinguished.

In some instances again, the iris is pushed forward, and is observed to lie in close contact with the internal surface of the transparent cornea : The coats of the eye being weaker here, than in other parts, a protrusion commonly takes place, which, if not soon opened, at last bursts of itself, and discharges either some part or perhaps the whole contents of the eye ; and at this opening, the iris, in a thickened diseased state, is very generally pushed out. It is this disease which, from its supposed resemblance to a grape, is denominated Staphyloma ; different varieties of which are described by authors under different names : but, as these are all of a similar nature, and require the same method of treatment, any difference of form from
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whence these denominations have been taken, is not of such importance as to deserve notice; and as the distinctions they hold forth, answer no good purpose, I do not mean to enumerate them.

Under the general term of Staphyloma, a word I shall retain merely from its having been long employed, may be comprehended all collections, such as I have described, that take place within the cavity of the eye. In most instances, as I have already observed, the transparent cornea is protruded from its being the weakest part of the eye; but in others, partial swellings or protrusions occur in the sclerotic, or opaque cornea.

During the formation of this disease, the patient suffers not only loss of sight, but severe pains in the eye, that shoot backwards through the head, attended with want of rest, heat, and other symptoms of fever; and these very commonly remain either till the eye bursts of itself, or till its contents are discharged by an opening made for the purpose.

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In most instances, the pain is severe, but I have met with cases in which no other inconvenience was experienced but deformity and loss of sight: But in these, any matter that forms in the swelling is in small quantity, and the principal part of the tumor appears to be produced by serum; and in some instances perhaps by an increased secretion of the aqueous humour of the eye; but, whether it contains a greater or smaller proportion of pus, the external appearances are the same, and the method of treatment is likewise similar.

Besides the collections I have described, in which the matter is lodged within the coats of the eye, this organ, we find, is liable to abscesses of a different nature, in which the matter is seated in the substance of one or other of its tunics. In the small-pox, it sometimes happens, that a pustule is seated on the eyeball, when the varicellous matter being formed between two of its coats, gives all the appearances of a small abscess: but collections of pus
also

also occur here from external injuries ; and from inflammation, by whatever cause it may be induced ; although by no means so frequently, as I have already remarked, as in other parts of the body.

This disease has, in general, been termed Hypopion. It ought not, however, to be distinguished by any particular appellation ; for, it is precisely an abscess in the coats of the eye, and exhibits exactly the same appearances here, and requires to be treated in the same manner, as collections of matter in any other part.

The matter in this disease is met with in various parts of the eye ; in some instances in the sclerotica ; but most frequently in the transparent cornea, when it very commonly destroys vision entirely.

The hypopion is distinguished from the staphyloma by the matter being collected in a particular bag or cyst ; at least it is always confined to one part of the eye, which is observed to be elevated

ted into the form of an ordinary abscess, whilst the rest of the eye retains its usual form: But in the other, although the matter always at last forces out some protuberance; most frequently, as I have already observed, in the transparent cornea; yet an enlargement may be commonly observed over the whole substance of the eyeball: In both, the motion of the eyelids is much impeded; but, in the staphyloma, this is always more considerable and more distressful than in the other, and in it also a sense of tightness is felt over the whole globe of the eye; whereas, in the hypopion, this uneasiness occurs at a particular point only. In the latter, the pain is seldom so severe as when the matter is collected within the ball of the eye. Any uneasiness produced by it, affects the surface of the eye only, and does not spread back towards the head as it commonly does in the staphyloma.

In the treatment of the staphyloma, as it rarely happens that the use of the eye can be preserved, our great object should

be to abate the violence of the pain, and remove that deformity which an enlargement of the eye is always sure to produce. With a view to abate the pain, blood-letting, blisters, cooling applications to the eye, and opiates, are to be chiefly depended on at first : In this stage of the disease, indeed, the pain is to be considered entirely as the effect of inflammation, and to be accordingly treated in the manner I have pointed out in Section II. of this Chapter.

But when these and the other means employed for abating inflammation do not succeed ; if suppuration takes place ; and if the pain still continues severe, as this very commonly occurs from the coats of the eye being distended ; nothing will so certainly give relief, as discharging the matter by making an incision into the ball of the eye. This will commonly indeed evacuate all the humours of the eye, particularly the aqueous humour ; but in circumstances such as we are describing, this is not to be regarded, as vision is already totally

tally destroyed by the disease. We are therefore to use the most effectual means for removing pain, and for obviating the deformity induced by the enlargement of the eye, without any regard to the humours which it contains. For this purpose, an opening should be made in the eye sufficiently large for discharging all the thinner part of its contents, the best situation for which is the most depending part of the tumor. The patient's head being secured by an assistant, and the operator standing before him, the eyelids may be sufficiently separated with the fingers of one hand, while the point of the knife, fig. 4. Plate XII., being introduced with the other into the part to be opened, it may be easily carried forward in a horizontal direction, till an opening is made of a size sufficient for the purpose.

Authors who have written upon this subject, instead of a simple incision into the tumor, direct all the prominent part of the eye to be cut off either with a scalpel or scissars: Whilst others, from an apprehension

hension of hemorrhagies from an extensive wound, have advised the tumor to be removed with a ligature; by which they imagine that the eye may be sufficiently diminished, at the same time that the deformity produced by the swelling will be effectually removed. There is no necessity, however, for our adopting either of these methods; which are both of them more painful, and neither of them in any respect more useful than the mode I have advised, of discharging the contents of the tumor by a simple incision. The disease, as I have already observed, is in reality an abscess, or a collection of matter within the coats of the eyes; and ought to be treated exactly in a similar manner with abscesses in other parts of the body; not by removing any part of the tumor, but merely by laying it open. There is indeed a variety of the staphyloma sometimes met with, in which, either from a long continuance of the disease, or from some cause with which we are not acquainted, the different humours of the eye
are

are totally absorbed, or as it were annihilated, and in which all the external appearances of the disease that have just been described, are distinctly observed; but in which the tumor is formed by a thickening of the different coats of the eye, and particularly of the iris. In this situation, no benefit could ensue from this operation; nor from any other means, but the extirpation of all the prominent part of the eye; which is best done with a scalpel. It rarely happens, however, except in the very advanced stages of the disease, that this variety of staphyloma is met with.

After the contents of the eye have been discharged, the parts should be slightly covered with a soft compress, moistened with a weak saturnine solution; the patient should be kept upon low diet; and every part of an antiphlogistic regimen should be pursued, either till the wound in the eye is completely cured, or till there appears to be no risk of inflammation.

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With respect to the cure of hypopion, namely, that species of the disease in which matter is collected either in the substance of one of the coats, or between two of the coats of the eye, it should be nearly the same with what I have advised for staphyloma. In general, the pain is moderate, or is easily kept so with small doses of opiates ; and as soon as the matter is freely and clearly formed, it should be discharged by an incision made in the manner I have mentioned, in the most depending part of the abscess.

The general practice on this point ought not however to be followed. We commonly observe that practitioners decline to operate, till they are in some measure forced to it, either by the deformity being considerable, or by the abscess becoming so large as to impede the motion of the eyelids.—But delays should be always avoided when it is obvious that suppuration has taken place ; for as the matter of the abscess may just as readily burst inwardly, and mix with the humours of the eye,

eye, as outwardly by an external opening ; and as this very constantly terminates in a total loss of vision, it ought in every instance to be guarded against, by discharging the matter as soon as it is certain that suppuration has taken place.—The after-treatment of the parts should be the same here as in cases of staphyloma.

In both these diseases, fungous excrescences are apt to form where the opening has been made ; but this we may commonly prevent or remove by the application of calcined alum in fine powder, or touching the parts from time to time with lunar caustic, a practice from which I have never known any hazard ensue.

SECTION X.

Of dropfical Swellings of the Eyeball.

IN dropfical fwellings of the eye, the patient complains of a fenfe of fulnefs in the eyeball, long before any increafe is perceived in it by others : At laft the motion of the eyelids begins to be impeded ; and although the power of vifion ftill in fome degree continues, yet it gradually becomes more imperfect, till at laft the patient can fcarcely diftinguifh light from darknefs. In this period of the difeafe, fome part of the eye, moft frequently the transparent cornea, generally begins to protrude, fo as to form a fmall tumor, and if the contents of the eye are not now difcharged by an operation, the fwelling in this ftate commonly proceeds to increafe quickly, and foon burfts of itfelf.

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When the disease has been of long duration, it is apt to be mistaken for staphyloma, to which indeed it bears a resemblance; but, in the real dropical swelling, the patient is always sensible to the effects of light; and if the pupil can be distinguished, a clear light will commonly make it contract. Whereas, in the other, excepting in its very first stages, the patient is never sensible to light, nor can any kind of contraction be discovered in the pupil. When these diseases, however, are far advanced, our being able to distinguish them could be of little importance, as in this situation the use of the eye is in general so much destroyed as not to be recoverable: But in the commencement of this affection, we may very commonly distinguish it from the other; and when we are able to do so, it ought not to be neglected.

Staphyloma is evidently an inflammatory disease: It begins with all the symptoms of inflammation, and terminates in the formation of pus. By this circumstance alone it is very distinctly marked;

so that, in the early period of the disease, it is easily distinguished from a mere drop-
sy of the eye; in which no symptoms of inflammation take place, and in which the only marks of disease at first are, a sensation of fulness in the eye, which by degrees terminates in an enlargement of the eyeball, and in a confused state of vision.

When, by a long continuance of the disease, vision is destroyed, all that we have in our power to do, is to remove the deformity arising from the enlargement of the eyeball; which is most effectually done by an incision made in the most prominent part of the tumor, in the manner that I have mentioned in the last section. But in the earlier stages of this tumor, an object of greater importance presents itself, I mean the possibility of saving the use of the eye; which, from the result of some cases that I have met with, there is reason, I think, to imagine might in many instances be done.

When water or any other fluid collects in the eye in such quantities as to enlarge
it

it much beyond its natural size, vision is thus frequently destroyed merely by distention, when no other morbid affection is perceived. In such circumstances, when the nature of the disease is obvious, and as soon as the eye begins to lose its usual powers, instead of allowing the swelling to increase, as is commonly done, till it arrives at a great bulk, and till the power of vision is lost; would it not be better to discharge the fluid by which the swelling is produced? No danger could result from it, for the operation may be done with safety; and it would at least prevent the eye from suffering by over-distention, and might thus give some chance of a cure being obtained, either as an effort of nature, or by the application of proper remedies.

The easiest and best method of performing this operation, is by making a small opening in the under and most depending part of the transparent cornea. By passing the point of the knife, fig. 4. Plate XII., into this part of the cornea,

and

serving the eye, I do not hesitate to commend it in preference to the usual practice of allowing the tumor to become so large before being opened, as to produce in almost every instance an entire loss of the organ.

When the tumor has become so large as to destroy vision entirely, it has been proposed to discharge the contents of it, by passing a small seton or cord through the eye : But in an organ of such delicate mechanism, whose parts are all extremely irritable, there is reason to imagine that more pain and inflammation would in general ensue from this, than from a free incision made with a knife, or with a lancet ; and as the full intention of the operation may be obtained by this means, it should therefore, I think, be preferred.

SECTION XI.

Of Blood effused in the Cavity of the Eyeball.

A FREE passage of the rays of light to the optic nerve, so necessary for a perfect state of vision, requires a clear and transparent state of the different humours of the eye. We find accordingly, that vision is always greatly impaired, in many instances even destroyed, by any of the humours becoming opaque, and nothing tends more certainly to induce opacity of the aqueous humour than blood being effused in it.

Blood may be effused in the aqueous humour of the eye, by various causes. In some instances it has been the effect of putrid diseases, either producing a dissolved state of the blood ; or arising more probably from a relaxed state of the solids, by which the red globules of the blood are
admitted

admitted into vessels and parts which do not naturally receive them, and by which all the secretions are in these diseases frequently tinged with blood. Blood is sometimes poured into the eye, too, as the effect of an inflamed state of this organ ; but we meet with it more frequently, as the consequence of a ruptured bloodvessel from external violence, than from any other cause. It frequently ensues from blows on the eye, and from wounds that penetrate the posterior chamber. In some instances, too, wounds that penetrate the anterior chamber only are succeeded by effusions of blood ; but this is not frequent, as the vessels of this part of the eye are in general so small that they do not admit red blood.

In whatever manner blood may be effused in the eye, if it mixes with the aqueous humour, so as to render it opaque, and is not soon absorbed, it ought to be discharged by an operation. In a few cases, we observe, that a small quantity of blood is effused in the eye, without exciting

ting any inconvenience, by its sinking immediately below the axis of vision, and remaining in this situation without mixing with the aqueous humour. In this case, no attempt should be made for removing it; for, as long as it continues at the bottom of the eye, no harm is done by it; and we have it always in our power to remove it, if, at any period in future, it is found to dissolve in such a manner in the aqueous humour as to render it opaque, or materially to injure vision. The method of performing this operation should be the same with that which I have pointed out in the last section, for the removal of dropsy of the eye.

The opening should be about three-tenths of an inch in length, and be made as near to the most depending part of the transparent cornea as the junction of the iris to the coats of the eye will permit: In order to promote the discharge of the blood, the patient should be desired to turn his face downwards, and the sides of the divided cornea may be somewhat separated

rated by the end of a blunt probe. As the aqueous humour will be discharged along with the blood, the eye will appear to be much diminished by the anterior part of it collapsing. This, however, is a matter of little importance; for the wound in the cornea commonly heals soon, and the aqueous humour is in general quickly renewed. The only application required after the operation, is a compress of soft lint moistened in a weak solution of saccharum saturni.

SECTION XII.

Of Ulcers on the Globe of the Eye.

IN Chapter IV. the theory and management of ulcers were fully considered; so that I shall refer to what I there endeavoured to establish: But ulcers on the eye merit particular attention; for we have here not only the cure of the ulcers to keep in view, but means must be employed to prevent or remove those marks or spots which they almost universally produce, and which very commonly terminate either in a total or partial loss of sight. In other parts of the body, the cicatrix induced by an ulcer is seldom productive of much inconvenience; but in the eye, the cicatrix of even the smallest sore does much harm. It is evident, however, that this effect of ulcers must depend much on the part of the eye on which they

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are seated. Thus, we observe, that even large ulcers form on the tunica conjunctiva without vision being injured; whilst they commonly destroy it entirely when seated on the transparent cornea: Our prognosis therefore, must in general, in a great measure, depend on their situation; for sores, which in one part of the eye might be of little importance, will in others render the organ useless.

The danger arising from ulcers on the eye, depends in some measure, too, upon their form, which we find to be equally various here as in other parts of the body; but the structure of the eye renders the form of any sore that occurs in it of more importance than it can possibly be in any other situation. In some instances, ulcers upon the eye are very superficial, being no deeper than the tunica adnata; whilst in others they are small, narrow, and penetrate to a considerable depth. Those which spread upon the surface of the eye may destroy vision by the cicatrix which they produce; but the deep-seated
ulcers

ulcers are not only attended with this effect, but very commonly terminate in an evacuation of the aqueous humour, either from their penetrating immediately through all the coats of the eye, or from their leaving such a weakness in some particular part, as admits of the aqueous and other humours forcing a passage for themselves.

In other cases again, instead of a loss of substance being produced by ulcers, the parts become soft and fungous, and excrescences or granulations shoot out, as we frequently find to be the case in sores of other parts of the body.

Ulcers of the eye may arise from various causes; such as wounds, contusions, and burns. And they may be induced by a general disease of the constitution; such as lues venerea, and scrofula. But in most instances they may be traced as the effect of inflammation terminating in suppuration; for abscesses in the eye are often met with; and every abscess terminates in an ulcer, excepting in a very few

H 3 instances;

instances; in which they either continue during life, or in which the matter, instead of being discharged by an opening, is absorbed into the system.

Ulcers of the eye are not only often induced by inflammation, but it commonly happens, that inflammation is the most troublesome symptom with which they are attended: Indeed the pain arising from an inflamed state of an ulcer on the eye, proves in some instances so very distressful, as to induce restlessness, heat, quickness of pulse, and every other symptom of fever: So that in the treatment of these ulcers, this symptom of inflammation requires our most serious attention.

When they are found therefore to be in an inflamed state, blood-letting, both general and local, should be employed; together with blisters, laxatives, and cooling applications to the eye, in the manner pointed out in Section II. of this Chapter, for the cure of Ophthalmia: For till the violence of this symptom abates, no remedy we can employ for the cure of the ulcers will

will answer the purpose: In other cases of ophthalmia, along with general evacuations, I have urged, in a particular manner, the propriety of local blood-letting, by scarifying the turgid vessels of the eye. In ulcers of the eye, too, where enlarged vessels are observed to pass from the sores over a considerable part of the eyeball, it often proves useful to cut these vessels completely across; not only for the removal of inflammation, but for the cure of the ulcers. From observing the effects indeed that result from this, I think it probable, that the discharge arising from ulcers of the eye is commonly supplied by the turgid vessels that run into them; for it often happens, that the sores are cured by this remedy alone, when every other means have failed. The operation, however, requires to be very neatly and steadily performed; for when deep and extensive scarifications are made in the neighbourhood of an ulcer, they are apt to degenerate into tedious sores of a similar nature. This, however, is not the fault of the remedy,

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but of the method of putting it in practice: for it is an effect I have never observed to result from it, when the turgid vessels only have been divided; which may be easily done in the manner I have mentioned in Section II. of this Chapter.

Some have objected to this practice, that by dividing the lymphatics, which proceed from the sores along with the turgid bloodvessels, the healing of the sores will be rendered more tedious than it otherwise would be; for these, by absorbing the matter secreted or discharged into ulcers, they conclude must have a considerable influence on the cure: And therefore, it is said, that we should not run the risk of dividing them, by scarifying the large vessels of the eye, which they very commonly accompany. The idea is ingenious; but so far as I have observed, it is not supported by experience. Scarifications, when improperly performed, may in some instances, as I have observed above, do harm; but in
many

many cases of ulcers of the eye, I have known them prove very useful. Besides, we might, from reasoning alone, conclude, that scarification, when properly performed, ought not to do harm; and that the doubts which have been entertained with respect to it, cannot be well founded: For although some proportion of the matter afforded by ulcers is no doubt carried off by absorption, yet daily experience shows, that we are never to depend upon this for effecting a cure; and, on the contrary, that sores are more frequently cured by applications, that seem to act by destroying the power of the absorbents, as well as of the other vessels with which ulcers are supplied, than by any other means; namely, by drying astringent remedies, and by external pressure, applied with such firmness as must frequently annihilate the smaller vessels of sores, by keeping them for a considerable time closely compressed together.

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After the inflammatory state of an ulcer on the eye has been removed in the manner I have mentioned, our views should be exactly the same as in the treatment of sores in other parts of the body ; and the means employed for effecting them, must, for the most part, be likewise similar. When it appears to be connected with any general disease of the system, this must be corrected before any permanent cure can take place. In some instances, sores on the eye are combined with lues venerea ; in which case a well-directed mercurial course is alone to be trusted to : But they are much more frequently combined with scrofula ; a disease which often affects the eyes more than any other part of the body ; and hitherto we have not been so fortunate as to discover any certain remedy for its removal. Gold bathing, however, with the use of muriated barytes, steel mineral waters, bark and other tonics, and living in a dry atmosphere, frequently prove useful ; and for the symptom that we are now considering, namely,
ulcers

ulcers on the eyes, issues, when duly persisted in, are to be more depended on than any remedy with which we are acquainted.

In the local treatment of sores upon the eye, the remedies to be employed must depend entirely on the appearances which take place. Before any attempt is made to induce the formation of a cicatrix, any fungous excrescences which occur must be destroyed; and if the matter discharged is thin, and the bottom of the ulcer foul, these circumstances must be corrected. With this view, detergent ointments and washes, as they are called, should be applied; and for the removal of excrescences, the scalpel and escharotics are alone to be depended on.

A general prejudice prevails against the use of stimulating applications to the eye; and in many of the diseases to which this organ is liable, they certainly cannot be employed with propriety; but in others, especially in ulcers, they may not only be applied with safety, but with much advantage.

advantage: in many instances a cure cannot be otherwise obtained, and much mischief is daily done by the contrary practice of a long-continued use of emollients. In cases of ophthalmia, accompanied with much pain and tension, a proper use of emollients, particularly of warm fomentations and cataplasms, proves in some instances extremely useful; but in ulcers of the eye, after the inflammation is removed, instead of being productive of any advantage, I have constantly observed them do harm. They not only seem to promote that tendency to relaxation and sponginess which usually occurs in these sores, but in different instances they have appeared to be the sole cause of those excrescences very frequently met with in ulcers of the eye, and which always prove extremely troublesome. When I first engaged in practice, I entered into a free use of remedies of this class, in ulcers as well as in other affections of the eyes; but I now think it fair to acknowledge, from repeated instances of their proving hurtful, that

that I am convinced that they should be employed with caution.

When the ulcers are hollow, with foul edges, and discharge thin and perhaps fetid matter, a liniment of wax and oil, with a small proportion of red precipitate, commonly answers the purpose of cleansing them; or the same intention may be obtained from a remedy of the same nature, prepared with white vitriol, or with a small proportion of verdigris; care being taken to have the liniment of such a thin consistence, that with a small brush or pencil a little of it may be easily applied at any time over the surface of the sores. By adding a small proportion, too, of camphire to these ointments, their effects in cleansing ulcers of the eye are frequently improved; and the same remedy proves sometimes useful in a dissolved state, when employed as a wash to the sores. The most effectual wash, however, for this purpose, is either a weak solution of verdigris or white vitriol in water; and I have in some instances employed, with
 advantage,

advantage, a weak solution of corrosive sublimate. One grain of corrosive mercury in four ounces of water, makes a solution of a sufficient strength for this purpose.

Practitioners not accustomed to the application of irritating substances to the eye, may be surpris'd to find red precipitate, verdigris, and even corrosive sublimate, recommended ; but daily experience shews, that in many diseases of this organ, they may be employed both with freedom and utility.

When by a due continuation of these means, or of remedies of a similar nature, an ulcer on the eye is properly cleansed, and a good suppuration induced, granulations will soon be observed to form ; any deficiency of parts which may have been induced by the sore will be fill'd up ; and, if no interruption occurs to the cure, a cicatrix will soon be obtained.

It often happens, however, in this state of the ulcer, that a cure is difficult to accomplish. The surface of the sore remains
 3 soft,

soft, and becomes somewhat elevated above the rest of the eye, by which a cicatrix is prevented. In this situation, drying astringent applications prove most useful. The parts affected should be covered once or twice daily with lapis calaminaris finely levigated; with prepared chalk, or crabs-eyes; and they may be bathed morning and evening with a strong solution of alum; with brandy properly diluted; or with a strong infusion of galls or oak-bark: by these means, when the constitution is otherwise healthy, a cure will in general be obtained.

When, again, the sore, instead of being hollow and attended with a destruction of some of the parts in which it is seated, is found to be covered with a fungous production, this excrescence must be removed before any permanent cure can be obtained; and the same means must be employed for the purpose here, that prove most effectual for the removal of excrescences in other parts of the body.

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In some instances, these productions arrive at a considerable size, and, after separating the eyelids, fall down upon the upper part of the cheek. Of this, different cases are recorded by authors; some of which were on dissection found to be connected with the more interior parts of the eye, and in which extirpation of the eye might have saved the patient: But it sometimes happens, that tumors of this kind adhere to the surface of the opaque cornea only, when they may commonly be removed without any material injury being done to the eye. In general, we are directed to remove these excrescences with ligatures; but as this commonly proves painful, tedious, and uncertain, the scalpel or lunar caustic ought in every instance to be preferred.

For the removal of a large excrescence, excision by the scalpel should alone be trusted; and when done with caution, no danger ensues from it. The patient being firmly seated opposite to a clear light, and the surgeon sitting before him, his head should

should be supported by an assistant behind, who at the same time should separate the eyelids, by elevating the one and drawing down the other; which may be easily done by the fingers of each hand properly placed on them. This being done, a needle armed with a firm waxed ligature should be passed through the centre of the excrescence, for the purpose of fixing it and raising it as much as possible from the surface of the eye: With one hand the operator should now lay hold of this ligature, while with a scalpel in the other he slowly and steadily removes the excrescence. The only dressing that should be applied, is a piece of soft lint soaked in a weak solution of *saccharum saturni*, laid over the eyelid; and if the sore produced by the operation does not heal easily, some of those astringent applications should be employed that I have just had occasion to mention.

But in the treatment of excrescences of the eye which are neither pendulous nor

much elevated, there is no necessity for the use of the scalpel, as they may almost always be removed by a proper application of caustic. By touching the surface of the part intended to be destroyed with a piece of lunar caustic, either daily or once in the two days, the protuberance will soon be removed; and the sore being in this manner reduced to the level of the rest of the eye, a cure may be obtained by the means I have already mentioned.

It is necessary, however, to remark, that in the application of caustic to the eye, much steadiness and nicety is required; but with due attention it may be done with perfect safety, and often with much advantage. In order to prevent the rest of the eye from suffering by coming in contact with the caustic, the eye should be previously fixed with a speculum; and after the excrescence is rubbed over with caustic, before removing the speculum it should be entirely washed off
with

with a small brush or pencil soaked in warm water; or in warm milk, which proves commonly more effectual than any other liquid for destroying the activity of caustic. In this manner, all the advantages may be obtained from the use of lunar caustic that we daily derive from it in the removal of excrescences in other parts of the body; and when applied with caution, it may be done without risk.

I have already remarked, that when the constitution is sound, ulcers of the eye will commonly heal by the means that I have mentioned; but it happens in some instances, that they still continue obstinate, and even daily become more virulent, notwithstanding the use of these and all the other remedies that are employed: In which event, whenever the disease has advanced so far as to destroy vision, and when it is still proceeding to increase, as nothing but extirpation of the morbid parts will afford any chance of prevent-

ing it from spreading to the contiguous sound parts, this ought certainly to be advised. The method of extirpating a diseased eye will be the subject of a different section.

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SECTION XIII.

Of Specks or Films upon the Eye.

VISION is frequently destroyed or impaired by opaque spots or films forming upon the eye; a disease commonly termed Leucoma, Albugo, or Nubecula.

These spots are met with occasionally on the sclerotica or white part of the eye; but, as the inconvenience that ensues from them in this situation is seldom of much importance, they do not often become the object of surgery: but in the transparent part of the eye, they require very serious attention; for in this situation, even the least degree of opacity is apt to terminate in the entire loss of vision: And although we cannot in every instance remove them entirely, yet we can often do so, and, by proper treatment, we have

it frequently in our power to preserve eyes which otherwise would in all probability be lost.

I have already given a description of various affections that may tend to obstruct vision, by inducing an opaque state of the transparent cornea and humours of the eye. Thus, every high degree of inflammation; the staphyloma, hypopion, and ulcers on the transparent part of the eye; are all attended with this effect: But as each of these forms a distinct disease, requiring a method of treatment peculiar to itself, I have judged it proper to allot a separate section for each of them; and, what I now mean to consider, are those white opaque spots frequently met with on the cornea, which occur most commonly as the consequence of inflammation.

Affections of this kind are for the most part, indeed, so evidently induced by inflammation, that it may be doubted if they ever occur from any other cause; for all those specks which succeed to
wounds

wounds of the cornea, as likewise those which arise from small-pox and measles, are always preceded by an inflamed state of the eye: I therefore conclude, that they depend, perhaps entirely, on inflammation, by whatever cause this may at first be excited.

In attending to the nature of these opaque spots on the cornea, it appears sufficiently obvious, that in most instances they are the effect of that effusion, which inflammation, when in a high degree, always excites. In some cases, when it terminates in complete suppuration, a small abscess is produced; which, either on bursting, or on being opened in the manner directed in a preceding section, very commonly leaves an opaque spot, attended with some degree of prominency or elevation of the parts in which it is seated: But in others, when the effusion, instead of being near to the surface of the cornea, is diffused among the different lamellæ of which this coat of the eye is composed; or when the degree of inflammation which

takes place is not sufficient for carrying it on to suppuration, the opacity induced by it does not, as in the case of an abscess, form a protuberance ; but appears rather to constitute a part of the substance of the cornea itself. In the one, the different lamellæ of the cornea are evidently separated from each other ; and on the matter contained between them being discharged, the speck which remains appears in the form of an adventitious body, adhering to, but not intimately connected with, that part of the eye on which it is seated : Whereas, in the other, that is, when a small effusion only has taken place, and when no tendency to suppuration occurs, although a very considerable degree of opacity may be produced by it, yet the nicest examination will not discover the cornea to be at this part either elevated or increased in thickness. In this case, the disease appears to form a part of the eye itself, and cannot be separated from it but with the destruction of the organ ; whereas, in the other, the appearances which it exhibits

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are such as would lead one to consider it as a preternatural formation; and in many instances it may be removed without much injury being done to the eye.

These spots upon the eye are met with in various forms and in different degrees of magnitude; but the inconvenience which they induce is always in proportion to their extent, to their degrees of opacity, or to their situation with respect to the pupil; for as they prove hurtful merely by preventing the rays of light from passing to the bottom of the eye, it is evident that it is by one or other of these circumstances that this must be determined. When a spot upon the eye, therefore, is either so small, so slightly opaque, or so far removed from the pupil, as not to injure vision, it ought not to be considered as an object of surgery; for till the use of the eye is impaired by it, as it is never attended with pain, unless when the parts are inflamed, no other consideration can render it proper to meddle with
with

with it: For every practitioner knows, that this organ is so very delicate, as often to suffer more by the means employed for removing diseases, than it previously did by the diseases themselves. But whenever vision is materially impaired, we are then authorised to endeavour to remove the cause by those means which experience has shewn to prove most fit for the purpose.

I have endeavoured to shew that inflammation is to be considered as the principal and perhaps the only cause of specks upon the eye: This should therefore be a powerful argument, in every instance of inflammation of the eye, for losing no time in the application of the most efficacious remedies; for, whenever it has gone so far, as to induce even the smallest degree of effusion, we can never with certainty prevent either a partial, or perhaps a total loss of sight. The means best adapted for the removal of inflammation having been already detailed in Section II. of this Chapter, it is not necessary to repeat them; so
that

that I shall now mention those remedies only on which we should chiefly depend for the cure of specks that are already formed.

In the management of specks upon the eye, it is a matter of much importance to attend to the particular nature of each of them; for the two varieties I have mentioned are so different from each other, that such remedies as prove useful in the one, are scarcely, if at all, admissible in the other: And hence we find, that the same applications being indiscriminately employed in every case, much injury is done which ought not to happen; and remedies fall into discredit, which, when properly applied, prove highly useful.

Thus, we find by experience, that escharotics of a moderate strength may with safety be applied to the eye; and as specks upon the cornea are often removed by them, it has long been a common practice to apply them with equal freedom in every case. By attentive observation,
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however,

however, to this branch of practice, I am convinced, that it is in one variety of the disease only that remedies of this class ever prove useful; namely, in that which is attended with an evident promi-
nency or elevation of the diseased part. In such instances, when the cornea beneath is found, the removal of this elevated opaque spot will leave it transparent, and fit for the purposes of vision; and in such cases, mild escharotics may with much propriety be employed: But in the other variety of the disease, where the effused matter seems to spread through the whole substance of that part of the cornea in which it is seated, without raising or elevating any part of it, no advantage is ever obtained from escharotics. In this case, the diseased part of the cornea, as I have formerly mentioned, does not seem to be thicker than the other parts of it; and it is impossible to destroy the effused matter without destroying the cornea itself. In such circumstances, the employment of escharotics can never be proper; and

and I have no hesitation in saying, that in this state of the disease, they can never be used but with much risk of doing harm.

It sometimes happens, however, even in this variety of the disease, that the patient recovers either a partial or even a complete use of his eye, by the opacity in the cornea being gradually carried off, probably by absorption taking place of the effused matter. As this has in some instances happened by a natural exertion of the system, practitioners should endeavour to assist this operation of nature, by employing such remedies as are known to prove most powerful in promoting absorption: With this view, there is nothing perhaps to be more depended on than a gentle course of mercury. In similar effusions in other parts of the body, mercury often proves useful; and it is the only internal medicine, which, so far as I have yet seen, should ever be employed in films or specks on the eye: Issues have in some instances, too, appeared to prove useful; and

and as a cord in the neck in general discharges freely, it commonly answers the purpose in the most effectual manner.

With the same view, too, a brisk purgative given from time to time, proves sometimes useful; but it must be acknowledged, that the effect of our practice in this disease is always uncertain: For, although in a few cases, some advantage has apparently been derived from these remedies, it has not happened so frequently as to admit of our placing much dependence on any of them.

But although we seldom derive advantage in this variety of the disease, either from internal medicines or external applications, it often happens in the other, that a due attention to the different circumstances of the case proves highly useful. As in this case we suppose the disease to be produced by a thin lamella of the cornea being elevated and separated from the rest of the tunic beneath, by an effusion of some kind of matter, and as this separated portion is in general opaque, our
chance

chance of effecting a cure is to remove it entirely. Even this will not always leave the eye perfectly clear and transparent ; for it sometimes happens, either from the effused matter having been of a sharp corrosive nature, or from its having been long confined, that a roughness, attended with some degree of opacity, is left upon that part of the cornea which remains. This, however, is not universally the case ; and, at any rate, although a complete cure may not in every case be obtained by the removal of the elevated part of the cornea, yet in almost every instance some benefit will ensue from its being thus made to admit a greater quantity of light to pass to the retina.

Spots of this kind may be removed either with the knife or with escharotics ; but, in general, the knife should be preferred. The head being secured by an assistant standing behind, and the eye properly fixed with a speculum, Plate XIV. fig. 1., the surgeon should seat himself in a convenient height between the patient and the
clear

clear light of a window ; when, with repeated small strokes of the knife, Plate XII. fig. 4., he should endeavour to cut away and remove all that portion of the cornea that he finds to be in any degree separated from the rest ; for no part of it that is loose will ever adhere again, and the cure will not be complete if any portion of it is allowed to remain.

The natural delicacy and irritability of the eye would appear to render this operation difficult ; but it may be done with ease by surgeons of steadiness and observation. The speculum I have mentioned fixes the eye completely ; and on the head being properly secured, the operation may be done with entire safety. The knife I have mentioned, is in most cases the best ; but in a few instances a knife with two edges I have thought has answered better. A representation of a knife of this kind may be seen in Plate XVI. fig. 1.

Patients, however, will not always submit to this operation : In which case we are obliged to employ escharotics ; by a
continued

continued use of which we have it often in our power to remove blemishes of much firmness and of considerable extent: and although strong applications of this kind are not admissible, and have frequently done harm, by creating inflammation and pain, yet I think it right to remark, that there is no cause for so much caution on this point as in general we are led to believe; for daily experience serves to evince, that a good deal of freedom may be used in the application of remedies of this class to the eye. It has been alleged, that, besides exciting pain and a temporary state of inflammation, escharotics must do harm by corroding and inducing ulceration on the sound part of the eye, just as readily as they will destroy the spot intended to be removed. This reasoning is specious, but not supported by experience; for every practitioner must have observed, and it is particularly well known to itinerants, who commonly use no delicacy in matters of this kind, that specks upon the cornea are frequently removed by escharotics,

without any kind of harm being done to the rest of the eye; and the fact, I think, may be explained. So far as I have been able to observe, those specks in which escharotics are employed with most advantage, consist of a substance in which there is little or perhaps no animal life; at least they are perfectly white, are destitute of the circulation of red blood, and are so far insensible, that little or no pain is experienced from their being cut or even bruised with much freedom. Now we know, that in other instances, escharotic or corrosive applications of a moderate strength will destroy a part of a dead animal, which did not in any degree act on it during the life of the animal. This is particularly remarkable in a process that sometimes occurs in the stomach after death; a curious fact, first taken notice of by the late ingenious practitioner Mr John Hunter. The stomach has frequently been found on dissection to have holes corroded in it, even where no pain or other symptom

symptom of disease of this organ had previously existed ; from whence we may fairly conclude, that the liquor gastricus, or that fluid which nature has provided for the purposes of digestion, although during the life of the animal it may act only as a moderate stimulus to the viscera, yet after death, the stomach being now deprived of the power of resisting the corrosive property of this liquor, comes at last to be destroyed by it. In the same manner we may suppose, that a dead lifeless spot may be removed by corrosive applications, the strength of which is not sufficient to affect the living part of the eye.

We may thus perhaps account for the cause of this phenomenon ; but whether this reasoning shall appear to be well founded or not, the fact, as I have said, is certain, that corrosive applications may be made to the eye sufficiently strong for removing many of those spots to which it is liable, without doing any injury to the rest of the organ.

Of this, a little is introduced on the end of a blunt probe, between the eyelids, evening and morning, at the same time that a weak saturnine solution is employed as a wash.

It is impossible, in cases of specks upon the eye, to confine any application to the diseased part: all we can do is to insert the powder, ointment, or wash, within the eyelid; by the motion of which it is very quickly conveyed over the whole surface of the eye. In order, however to have every possible advantage from remedies of this class, their use should be long continued, and two or even more of them should be employed at the same time. Thus, a small quantity of any of the powders or ointments I have mentioned, may be inserted within the eye evening and morning, and a weak solution of corrosive sublimate, of verdigris, or white vitriol, may be employed two or three times a-day for washing the eye.

It cannot be alleged, that these or any other remedies will in every instance prove effectual ;

effectual; but I can with confidence say, that a prudent and long-continued use of them has often removed spots upon the eyes, which otherwise would probably have terminated in an entire loss of vision.

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SECTION XIV,

Of Protrusions of the Globe of the Eye from the Socket.

EVERY practitioner must have met with instances of the eye being pushed more or less from its natural situation in the socket, and various causes are recorded of it by authors.

1. A partial protrusion of the eyeball takes place in some of the diseases of which we have treated in the preceding sections; particularly in the hypopion, staphyloma, and dropfical swellings of the eye.

2. The eye may be displaced or pushed from its socket by external violence. And,

3. It may be raised or elevated by tumors forming beneath it.

Even the slightest distortion or displacement of the eye affords a very disagreeable

agreeable appearance ; and to those not accustomed to meet with it, gives much cause to suspect that vision will be completely destroyed by it. All such affections have therefore been in general considered as incurable : Little or nothing has accordingly been done for removing them ; so that patients labouring under them have for the most part been allowed to finish a miserable existence without any means being employed for their relief. But although vision cannot in every affection of this kind be preserved, yet in most instances it may be done ; and wherever there is any chance of this being in our power, the attempt should undoubtedly be made.

As the means of cure must depend upon the cause by which the disease is induced, it is a point of the first importance to have it ascertained.

When the ball of the eye is enlarged from any of the causes I have mentioned ; namely, from water, pus, or any other fluid collected in any part of it, if a portion of it is by this cause pushed forward,
all

all that art can do is to diminish the size of the eye in the manner I have mentioned in different parts of the preceding sections, either by puncture, incision, or perhaps, by removing a part of it. In most cases of this kind, vision will be irrecoverably lost; but by the means I have mentioned, the deformity produced by the disease may be commonly removed.

When, again, the eyeball is pushed from its socket by external violence, as the optic nerve must in this case be suddenly stretched, we might *à priori* conclude, that vision would be destroyed by it. This will most frequently be the case; but it does not always happen: For, instances have occurred of the eye being pushed suddenly and entirely out of the socket, and on being replaced, of vision being as perfect as it was before.

Several years ago I met with an instance of this, in which the eye was almost entirely turned out of the socket by a sharp-pointed piece of iron pushed in beneath it.

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The iron passed through a portion of the socket, and remained very firmly fixed for the space of a quarter of an hour ; during which period the patient suffered exquisite pain ; he was quite blind in the affected eye ; and the eyeball being pushed so far out as to give reason to suspect that the optic nerve was ruptured, it was doubted whether it would answer any purpose to replace it or not. As no harm, however, could arise from a trial being made of it, I resolved to make the attempt ; and with much pleasure and astonishment I found, on removing the wedge of iron, which being driven to the head was done with difficulty, that the power of vision instantly returned even before the eye was replaced. The eye was now put easily into the socket ; and the effects of inflammation being guarded against, the patient enjoyed very perfect vision.

A case of a similar nature to this is recorded by a very ingenious practitioner, Mr White of Manchester : In which the eye was still more completely displaced than

than in the one I have mentioned, and in which the power of vision was scarcely affected*.

As in these cases the attempt to save the eye proved successful, where the eyeball remains entire, and is not altogether separated from the contiguous parts, we ought not to despair, however severe the injury in other respects may have been: Nay, we here have evidence of no material inconvenience having ensued even from a sudden extension of the optic nerve. No such case therefore should be considered as incurable, till it has actually proved to be so by the power of vision being entirely lost after every endeavour for preventing it has failed. All extraneous bodies being removed, the eye should be cautiously replaced; and with a view to prevent or render moderate the inflammation, which otherwise might probably run high, blood-letting, both general and local, should be advised, together with a strict antiphlogistic

* Vide Cases in Surgery, &c. By Charles White, F. R. S. &c.

gistic regimen. At the same time, light should be excluded from the eye, and it ought to be kept covered with a soft compress moistened in a weak saturnine solution.

When the eye is pushed out by a tumor situated beneath it, the cure must depend on a removal of the cause. When an abscess or a collection of any kind of fluid is attended with this effect, a cure may be obtained merely by laying the cyst or abscess sufficiently open: But when the tumor is firm, it must be entirely removed.

Here I think it necessary to remark, that practitioners are in general too timid in operating on tumors of this kind, owing to their near contiguity to the eye; insomuch, that when a tumor is situated entirely within the orbit, a patient is commonly advised rather to allow it to remain than to submit to an operation. As long as no material inconvenience ensues from such tumors; when they are not likely to degenerate into a worse nature; and when they appear to remain stationary without receiving

receiving any additional increase; it would surely be improper to advise a patient to undergo the pain and terror of an operation: But whenever they begin to acquire an additional bulk; when there is any reason to fear that they may ever become cancerous; and especially when they begin to impede the motion of the eye, and to push it out of the socket; no further delay should be admitted. In such circumstances, the safety of the patient requires the tumor to be removed, and it ought to be done without delay.

Even where these tumors have acquired a considerable bulk, they are more easily removed than is commonly imagined. By proceeding cautiously, they may often be taken out without hurting the eye, even where they pass deep into the socket. But where the eye has already been pushed from its situation, as nothing but the removal of the tumor can in any degree prove useful, it ought in every instance to be done, even although there should be some risk of the eye being hurt by it: For,
besides

besides the injury which such tumors do to the eye, when they increase to any considerable bulk, by pressing on the contiguous bones, they very commonly bring these likewise into a state of disease. In some instances, the bones become carious, and produce tedious ulcers; but most frequently they swell, become soft, and on being laid open, instead of the usual appearances of bone, they are found to consist of a clear gelatinous matter. In this state of the disease, no advantage can be derived from extirpating the tumor, so that it ought not to be advised; but this distressful situation may very commonly be guarded against, by the operation being done more early.

It sometimes happens, that the eye is pushed from its socket by an enlargement of the glandula lachrymalis. This forms a kind of tumor, of more difficult management than any other to which these parts are liable: We ought not, however, even in this case, to despair of effecting a
cure;

cure ; for even this gland, in a state of enlargement, has been entirely removed, without injuring the eyeball ; and there will seldom be much difficulty in replacing the eye, on the cause being removed by which it was pushed out.

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SECTION XV.

Of Cancer of the Eye, and Extirpation of the Eyeball.

THE eye, like every part of the body, is liable to cancer, a disease that cannot be cured by any remedy with which we are acquainted, and which therefore renders the removal of the diseased part necessary, in order to prevent it from extending farther.

Cancer of the eye is apt to succeed to staphyloma: The ball of the eye, after becoming enlarged, at last protrudes beyond the boundaries of the socket: It acquires a firm, and even a hard consistence: Vision is at last destroyed, and the tumor commonly acquires a red or fleshy appearance. In some instances, a yellow glutinous matter, but most frequently a thin acrid ichor, is discharged from the surface

face of the tumor. For a considerable time the patient complains only of heat, or a sensation of burning in the substance of the swelling; but at last he becomes distressed with severe pains, shooting through the whole of it, and across the brain to the opposite side of the head.

In this situation, blood-letting, opiates, and the external use of emollients, are commonly advised, with a view to render the pain moderate; but although in some instances this may be done by large doses of opiates, yet no remedy will prevent the disease from spreading; and as it is always a point of importance to remove cancerous tumors early, the operation ought always to be advised as soon as the disease appears to be evidently formed.

In Chapter IV. Section VIII. we entered fully into the consideration of Cancer. I there made it appear, that extirpation of the diseased part is the only remedy on which we ought to depend; that it often succeeds when employed early in the disease; that it must necessarily frequently fail,

fail, when the operation is long delayed ; and that practitioners have till of late years been often blamable, in having an ill-founded aversion to this operation, by which their patients have in many instances been prevented from submitting to it so early as they ought to have done. For a more particular discussion of this point, I must refer to the section I have mentioned ; but it is here necessary to remark, that this general aversion to operate in cases of cancer, has been carried still further, when the disease is seated in the eye, than in any other part of the body.

This general objection prevails against the extirpation of cancer wherever it is seated, that the disease is so apt to return, that the advantage to be derived from it is seldom equal to the pain, trouble, and confinement that arise from it. This, I have elsewhere shewn, is by no means the case : But when the disease is seated in the eye, another objection has been raised to it ; namely, the hazardous nature of the operation ; for, as it is im-

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possible,

possible, from the depth of the orbit, to secure any arteries with ligatures that lie at the under part of it, it has been supposed that much danger must occur from this circumstance alone : And accordingly, although we find the method of extirpating the eye has long been described in books, excepting by a few practitioners, the operation has been very seldom performed.

There is no cause, however, for this timidity : for although a good deal of blood is sent to the eye by different branches both of the internal and external carotid arteries ; yet, at the place where these are divided in extirpating the eye, they are commonly so much ramified, that no hazard, so far as I know, has ever occurred from this operation ; and I have not only done it frequently, but in various cases I have seen it performed by others. It is not the extirpation of a portion of the eye, namely, that part of it which protrudes beyond the orbit, that we are now considering, but the total removal of the whole eye,

eye, when it is altogether diseased. A partial extirpation of the eye is often indeed recommended, chiefly for the reason I have mentioned, the danger that is supposed to occur from a deep division of the ocular artery : but whenever the eye is in a cancerous state, as all the diseased parts must be removed in order to render the patient safe ; as I have endeavoured to shew that the eye may be altogether cut out without hazard ; and as no advantage can be derived from a portion of it being allowed to remain ; we should never hesitate in removing the whole. The method of performing the operation is this.

The patient should either be firmly seated in a proper light, with his head supported by an assistant ; or, what answers better in every tedious operation, he should be laid upon a table, with his head upon a pillow ; the most convenient posture not only for himself but for the operator. When the eyelids are diseased, they should be removed along with the eye itself ; but whatever part of them is found, should be

allowed to remain as a protection to the orbit.

In the course of the operation, it is a point of importance to have the palpebræ kept completely separate; for the most part this may be done by the hands of assistants, but in some cases where the ball of the eye is much enlarged, the palpebræ are more easily separated by means of two flat hooks, one of which is represented in Plate XIII. fig. 1.

When the eyeball has become so large as to protrude beyond the orbit, the operator will in general be able to lay hold of it with his fingers; but when this cannot be done, a broad flat ligature should be passed through the centre of the tumor, in order to fix it during the operation. While this is done with one hand, the surgeon, with a common scalpel in the other, must endeavour to separate the whole ball of the eye from the different parts to which it is connected. All the diseased parts should be removed; but care should be taken not to injure the bones;
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for as in some parts of the body they are extremely thin, much harm might ensue from their being hurt.

On the eye being taken out, the attention of the operator is first directed to the hemorrhagy: But although in some instances this may take place to a considerable degree, yet it does not often happen; for in general, the discharge of blood in this operation is so inconsiderable as scarcely to require the aid of compression to put a stop to it. But whenever it proceeds too far, it may be easily stopped by pressure; or, a piece of dry sponge being applied to the mouths of the bleeding vessels, pressure may also be employed, by stuffing the rest of the orbit with soft lint and applying a napkin over the whole, so as to make it press with some firmness on the sponge beneath.

When sponge, however, is employed, some attention is necessary in applying it; for when sponge is applied to the mouth of a bleeding artery, it is apt to adhere so firmly as to require a good deal of force,

as well as some management, to remove it. Before inserting the sponge, therefore, a piece of strong waxed pack-thread should be tied to it; by which it may be pulled out when the hemorrhage is suppressed.

As soon as a free suppuration takes place, the bandage and lint will be easily removed; and the only necessary dressing is a pledget of emollient ointment, to be continued as long as any discharge of matter takes place from the orbit.

In performing this operation, I have advised the common scalpel to be employed; and I have no hesitation in saying, that it is preferable in every respect to any instrument that has yet been proposed. Different forms of scalpels have been invented for this operation, particularly one with a considerable degree of curvature. As this has been in some instances employed, I have give a view of it in Plate XXI. fig. 1. But it does not answer the purpose so well as the straight scalpel; and in using it, we are more apt to injure the bones of the orbit.

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The operation I have described, namely, the extirpation of an eye, is attended with much pain to the patient, and appears to be of a cruel and dangerous nature to by-standers ; so that few surgeons have resolution to perform it. It ought in no instance to be advised where a cure can be accomplished by more gentle means ; but when this cannot be done, and when a patient will for certain die in misery if the eye be not removed, it ought surely to be advised as the most certain means of affording at least some chance of safety : For although it will not always answer, yet we know from experience, that in some instances lives have been saved by it, which otherwise would probably have been lost. We ought, however, to remember, that in every case of cancer, extirpation proves, *cæteris paribus*, most successful when practised early ; so that it should always be advised in cancer of the eye, as soon as it is evident that the disease is completely formed.

SECTION XVI.

Of Artificial Eyes.

AS the loss of an eye is always productive of much deformity, our being in some measure able to obviate this, is not unfrequently a desirable object; and by the ingenuity of modern tradesmen, it is easily done.

A thin concave plate of glass, silver, or gold being fitted to the orbit, must be coloured so as to match the other eye as nearly as possible; and if care is taken to render it perfectly smooth, it may be introduced beneath the palpebræ, and used without exciting pain. Of all these substances, however, glass is the most proper; for it not only can be made to resemble the natural eye more exactly than the others, but it is much more cleanly. It has been objected to the use of glass indeed, that it is apt to break by blows and
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other accidents : Of many, however, who I have known use this artificial eye, I do not remember an instance of any who ever were hurt by it.

An artificial eye may be fitted to any orbit, where the eye has either been sunk by the evacuation of part of its contents, or where a portion of the eyeball has been removed : But it seldom happens that any advantage is derived from this invention where the globe of the eye has been entirely taken away ; for when not supported beneath, the artificial eye sinks too deep into the orbit, and can never be made to fit properly. It is chiefly, therefore, in cases of hydrophthalmia and staphyloma in which it has been found necessary to evacuate a portion of the contents of the eye, or perhaps to remove some part of it, that artificial eyes prove useful.

SECTION XVII.

Of CATARACTS.§ 1. *General Remarks on Cataracts.*

VARIOUS definitions have been given of the term Cataract; some of which are sufficiently accurate, but others have rather tended to convey an improper idea of the nature of the disease.

Blindness, induced by an opaque body immediately behind the iris, forms the disease we name Cataract; and as we find from dissection that this opacity is in every instance seated in the crystalline lens, or in its investing membrane, a cataract may with propriety be defined, to be a deprivation of sight induced by an opaque state of the lens or of its capsule.

The real seat of cataract being a late discovery, we need not be surprised at finding

finding very perplexed and contradictory accounts of it in all our ancient surgical authors. By some it was considered as an affection of the internal surface of the cornea ; others imagined that it was seated in the vitreous humour ; whilst by many it was supposed to be produced by a new formation of a membranous substance within the cavity of the eye. By some this new production was supposed to be attached to the coats of the eye ; while others alleged that it usually continued loose, and floated in the aqueous humour. Some writers of eminence, too, appear to have confounded the gutta serena with this disease, the former being often mentioned and described under the name of the Black Cataract.

The fact, however, is now ascertained, that cataract, in a pure unmixed form, depends entirely on a diseased state of the lens or of its capsule ; and its appearance indeed is so distinctly marked, that no practitioner of experience can ever mistake it : But for the advantage of beginners,

ners, and of others not accustomed to this branch of business, I shall, in the first place, give a short history of the rise and progress of the disease; and shall afterwards endeavour to point out such circumstances as distinguish it more particularly from some other affections of the eye.

Instances sometimes occur, in which cataracts form suddenly, and a total loss of sight, with complete opacity in the lens, takes place at once without any previous affection. This, however, is rare; and it commonly happens, that the disease approaches in a very gradual manner, from a slight degree of dimness, with which it commences, to an entire loss of vision.

The first symptom that usually occurs in cataract is what the patient terms a weakness of sight, and which commonly takes place long before any alteration is perceived in the state of the lens. By degrees this weakness, or rather dimness of sight, becomes more considerable; and
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the patient, being from his feelings led to suppose that it is in some measure produced by dust or motes floating in the air, or by some opaque matter upon the external surface of the cornea, is often employed in rubbing his eyes ; and is surprised to find that his sight never becomes clearer from his doing so.

If in this state of the disease the eye is examined, the lens will be observed to have acquired a dusky hue ; and instead of being clear and diaphanous, which it naturally is, it will be found to be slightly opaque. By degrees the dimness of sight becomes more distressful, till at last it terminates either in total blindness, or perhaps the patient may be able to distinguish light from darkness ; but in the advanced stages of the disease, he can seldom distinguish colours, excepting those of the brighter kinds, nor can he find his way in roads where he is not perfectly acquainted.

In proportion to the degree of blindness that takes place, the lens is observed to become

become more and more opaque, till at last it is found to be either entirely white, or of a light gray or pearl colour. In a few instances this whiteness is confined to a small portion of the lens, and forms a small opaque spot in some particular part of it; but in general, the whole body of the lens is equally diseased.

During the whole course of the disease, the pupil contracts and dilates according to the degree of light in which it is placed; at least this will be always observed when the eye is not otherwise diseased. Cataracts, however, are often combined with gutta serena; in which case the pupil is not affected by any degree of light we apply to it: This, indeed, does not proceed from the state of the lens, but from the diseased state of the optic nerve.

Cataracts are not commonly attended with pain; but in some instances it is otherwise, when every exposure to light creates much uneasiness. This, however, is always to be considered as an accidental circumstance, depending probably on
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some degree of inflammation at the bottom of the eye, and not as a necessary symptom of cataract.

I have already observed, that cataract has been confounded with other diseases. This however, can only happen from inattention; for there is scarcely any other disease to which it bears much resemblance. But in books, we find it has been mistaken for the gutta serena; for the hypopion and staphyloma; and it has been confounded with white opaque spots on the cornea.

It is easily distinguished, however, from all of these. In cataract, the pupil contracts when exposed to much light, and an opaque body is observed behind the iris: whereas in an unmixed case of gutta serena, the pupil remains in a state of dilatation whatever degree of light is applied to it, and no opacity is observed at the bottom of the eye: It is distinguished from the hypopion, staphyloma, and white spots upon the cornea, by the evident marks of disease which in all of these

take place in the anterior part of the eye, the cornea itself; which in all of them is opaque, and which in the hypopion and staphyloma is commonly elevated into a small tumor or protuberance: Whereas in cataract, the only symptom that occurs, is, blindness to a greater or less degree, attended with a white opaque spot behind the iris, the cornea and every other part of the eye remaining perfectly sound. I have already observed, that this opacity is found by dissection to depend upon a morbid state of the lens. For the most part it is the body of the lens only that is diseased; so that the opacity is removed, and the eye appears perfectly clear on this being taken out: But in a few instances, the membrane or capsule that surrounds the lens is the seat of the disease; so that the same degree of opacity still continues even after the lens is removed.

—This, however, is not a frequent occurrence; but it is sometimes met with, and is with sufficient propriety termed the Membranous Cataract.

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It is difficult, or perhaps impossible, to ascertain the proximate cause of cataract; but I think it probable, that it consists in some degree of obstruction of the vessels of the lens, in some instances induced by external violence, but most frequently by some internal cause, for which we cannot properly account.

The existence of vessels in the crystalline is doubted indeed by many, who imagine that nourishment is conveyed to it by the small quantity of fluid that we meet with in the capsule of the lens.—But the fact I consider as established, that the lens is supplied with vessels from its capsule, injections having been made to pass from one to the other, not only in different animals, but in some instances in the human eye. But whether this could have been demonstrated or not, the existence of vessels in the lens, is rendered, I think, sufficiently probable, by a circumstance I took notice of in the history of the disease, namely, the sudden formation of cataracts, which in a

few cases has been observed. I have now met with several instances of this; in some of which the most complete degree of opacity took place in the crystalline in the course of a few hours from the first sensation of dimness; a fact that cannot be so readily explained on any other supposition.

It may be alleged, where the cataract is so speedily formed, that the opacity may arise from disease in the vessels of the capsule, and not of the lens itself. In some instances this may be the case; but in more than one of those to which I allude, the disease appeared to be fixed in the body of the crystalline, and the capsule remained perfectly sound; for on the lens being extracted, the opacity was entirely removed.

In confirmation, too, of this opinion, of cataracts being probably produced by some degree of obstruction in the vessels of the lens, I may remark, that they occur more frequently in women about the cessation of the menses than at any other period;

riod ; and we know that this period is particularly productive of obstructions in other parts of the body.

As long as the opinion prevailed of there being different species of cataracts, a variety of means were advised in the method of cure ; but now that the real nature of the disease is known, our sole object is to remove the opacity of the lens ; or when this cannot be done, we remove the lens itself from the axis of vision.

In confirmed cataracts of long duration, no advantage is ever derived from any internal medicine ; but in the incipient state of the disease, before the opacity of the lens is complete, mercury has in some cases proved useful. When inflammation takes place, blood-letting both general and local ; the application of blisters to the temples, together with a strict antiphlogistic regimen, should be advised ; and I have in a few cases derived advantage from the operation of brisk purgatives ; but nothing I have ever tried has answered so well as small doses of calomel often

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repeated. *Extractum hyoscyami*, *flammula jovis*, and other vegetable productions, have likewise been celebrated for their efficacy in cataract; but no trials that I have given them, and I have used them all in different instances, can justify the recommendation.

When mercury, and the other remedies we may employ, are found to fail, our next object, as I have already observed, is to remove the diseased lens from the axis of vision: This we accomplish by one or other of two surgical operations, namely, by pressing the lens from its natural situation in the centre down to the bottom of the eye, an operation commonly termed *Couching the Cataract*; and that operation which we denominate *Extraction of the Lens*, by which the diseased body is taken entirely out of the eye.

Each of these operations has been much employed; so that the merits of both ought long ago to have been ascertained: But although the subject is of the highest importance,

portance, it still remains in a state of uncertainty. By some practitioners, couching is preferred ; whilst others consider extraction of the lens as the only remedy on which we should place any dependence.

The uncertainty in which we still remain upon this point, proceeds, I believe, from this branch of practice having hitherto been for the most part in the hands of itinerants : And as practitioners of this denomination, have uniformly from their first outset in life, adopted one method of operating only, they have very universally condemned the other ; which they themselves neither practise, nor perhaps understand : So that regular practitioners, not being able to determine from their own experience, they have in general remained upon this point very undecided. But the public appearing now to be convinced of the propriety of intrusting this, as well as every other operation of importance, to established surgeons of reputation, opportunities will thus be afforded of determining

ning the point in question by experiment ; the only means by which any degree of certainty can be obtained.

In prosecuting the consideration of this subject, I shall endeavour to point out as clearly as possible the result of my own observations upon it, together with that of some of our best employed surgeons. With this view, I shall first describe the operation of couching ; and after considering the different steps of the operation of extracting the cataract, I shall attempt to draw a just comparison of the merits of the two,

§ 2. *Of COUCHING, or DEPRESSION of the CATARACT.*

I have already observed, that the operation of couching consists in pressing the cataract or diseased lens from its natural situation in the centre down to the bottom of the eye. By this means the opacity producing the
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the disease is removed from the axis of vision; and although the sight is never so perfect as before the lens became opaque, when the eye is otherwise sound it proves quite sufficient for the common purposes of life.

In the anatomical description of the eye, which makes the subject of the first part of this chapter, we have seen, that the lens is placed behind the pupil, where it is lodged in a slight depression of the vitreous humour, to which it is attached by a capsule, formed by a portion or lamella of the tunic which includes the vitreous humour itself. In couching, the lens is separated from its capsule; and being pressed down behind the iris, if the operation succeeds, it either remains there during life, or is dissolved in the aqueous humour in which it is lodged.

Before we proceed to this operation, some circumstances in a particular manner require attention; the most material of which are, the degree of opacity in the lens,

lens, and the state of the eye with respect to other diseases.

It is a fact well known to practitioners, that no operation can be performed on the eye, but with the risk of inducing inflammation ; a symptom that proves tedious, or otherwise, according to the constitution of the patient, and other circumstances of the case. This points out the propriety of proceeding with caution, and of attempting no operation on this organ, not absolutely necessary for the welfare or comfort of the patient. Where a patient is rendered so blind by cataracts in both eyes, that he cannot conduct himself in the common occurrences of life, we should not hesitate in advising an operation for his relief. In such circumstances, any risk of his suffering from inflammation is more than counterbalanced by the advantages he may derive from the operation. But when one eye only is lost, and the patient enjoys a perfect use of the other ; or where even both eyes are diseased, if the opacity of the crystallines is not so considerable

derable as to prevent the patient from managing his ordinary business ; or if it does not deprive him of his sight in any considerable degree ; in any of these circumstances, a prudent practitioner will rather avoid an operation, and will advise it to be delayed as long as vision remains tolerably perfect.

The ingenious Dr Richter of Göttingen is indeed of opinion, that the existence of cataract in one eye is particularly apt to produce a similar affection in the other, and therefore he advises the crystalline to be removed as soon as it becomes entirely opaque, whether it is diseased in the other eye or not. The propriety, however, of this advice can be only determined by further observation ; but it often happens, that together with an opaque state of the crystalline, the eye is in other respects so much diseased, as to afford no hopes of vision being restored by the cataract being removed ; in which case, as no advantage could be derived from an operation, it ought not to be advised. This is particularly

ticularly the case in the hypopion, in the gutta serena, and in every affection of the eye attended with an opaque state of the cornea.

Writers on this subject mention another reason, by which they think that practitioners should be determined, when the operation in cases of cataract should be advised. It has very universally been supposed, that a cataract ought to be in a particular state, in order to ensure success from an operation; inasmuch that we are advised never to operate unless this state of the disease is found to prevail. The state to which I allude, is a supposed state of maturity, which it is believed every cataract will sooner or later arrive at, and which is said to be clearly and evidently pointed out by certain appearances of the opaque crystalline.

It is true, that both in the operation of couching and extracting the cataract, the lens is sometimes found to be partly soft and in part very firm, and in a few cases it is even perfectly fluid; a circumstance commonly

commonly considered as unfavourable : But although this may have first suggested the idea of the unripe state of a cataract, as it is termed, yet no advantage has hitherto been derived from the distinction ; for notwithstanding a variety of signs have been mentioned, by which the real state of a cataract is said to be evidently marked, yet it does not appear to be supported by experience : On the contrary, we often find that a cataract is of a firm texture, that was previously suspected to be soft ; and vice versa.

Nothing, indeed, can render it more obvious, that this idea of the mature state of a cataract is ill-founded, than the variety of opinions that prevail respecting it : For while by some it is said that this state of the disease is indicated by a pure white or milky appearance, others assert, that a light grey or pearl colour is the most certain mark of it. Now, the fact is, that the real state of a cataract can never be known from its colour ; and the best-informed practitioners will allow, that no advantage
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is to be deriyed from this means of distinction.

The idea of a cataract being more ripe at one period of the disease than at another, originated, as I have observed above, from the crySTALLINE being in some instances found to be fluid, which gave cause to suspect that the first effect of a cataract is to induce a softness of the lens, and that this soft or fluid state of it is gradually altered by the progress or continuance of the disease, by which it is supposed to acquire a firm consistence, when it is conceived to be thoroughly ripe.

This opinion, however, of this being necessarily the first effect of a cataract upon the lens, is equally ill-founded with the idea I have mentioned, of the real state of the disease being to be distinguished by its external appearance; for we know from experience, that cataracts are often of a firm texture from the beginning. From my own observation, indeed, I would say, that the most frequent effect of cataract upon the lens is to produce a preternatural

natural degree of hardness through the whole of it ; as, for the most part, an extracted opaque crystalline is of a firmer texture than it is ever found to be when healthy and transparent.

We are, therefore, to conclude, with respect to this circumstance of the ripe or unripe state of a cataract, that in the treatment of the disease no advantage is to be derived from any thing we yet know concerning it. In the common acceptation of the term, indeed, the word ripeness has in this respect no determined meaning affixed to it : I would therefore propose, that instead of being employed to signify the *appearances* of a cataract, it should be applied only to express the *effects* that arise from it. In this manner, the term might still be retained with propriety ; for we might very properly say that a cataract is ripe when the patient is rendered entirely blind by it, and when therefore it is ready for an operation ; and, on the contrary, that the disease is still in an unripe state,

state, as long as vision is not much impaired by it.

As the state or consistence of a cataract, is much insisted upon by almost all who have wrote on it, I here judged it right to enter on this inquiry; and, on the whole, this conclusion I think may be drawn from what has been said, That in determining upon the propriety of operating, we are never to place any dependence on the appearance of the lens; that we are to be solely directed by the effects which cataracts produce, and by the state of the eyes with respect to other diseases. As long as vision remains tolerably perfect, whether in both or only in one eye for the reasons I have given, a prudent practitioner would rather avoid the operation: But, when the sight becomes much impaired, if the cornea is found to be transparent, and if the pupil dilates and contracts freely, according to the degree of light to which it is exposed, we should not hesitate in advising an operation as the only effectual means of relief. And when
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the operation of couching is agreed on, the following is the method of doing it.

As it is of importance in this as well as every operation upon the eye, to guard against inflammation, nothing should be omitted that can in any way tend to prevent it: The patient should be confined, for several days before the operation, to a low regimen: He should lose ten or twelve ounces of blood, and even more if his strength admits of it, and two or three purgatives should be given at proper intervals.

In performing this operation, and likewise in extracting the cataract, a large quantity of light is necessary; but no sunshine should be admitted; for by the irritation which it excites, the eye is prevented from being kept so steady, even with a speculum, as it otherwise may be. A north exposure should therefore be preferred.

The only apparatus to be provided for this operation, is a speculum of a proper construction, and of a size adapted to that of the eye; and an instrument termed a

needle, for the purpose of depressing the cataract. Different forms of the needle are represented in Plate XV.; and in Plate XIV. are delineated different views of the most useful speculum that has yet been invented.

As it is of much importance to have the eye properly fixed during the whole course of the operation, and as this is best done with a speculum exactly fitted to the eye, every operator should be provided with several sizes of this instrument.

The best needle for this operation is that of a flat form, represented in Plate XV. fig. 1.

The patient should be placed upon a low seat with his face towards the window, and the surgeon, upon a chair considerably higher, should be seated directly before him: An assistant standing behind must be directed to support the patient's head, which is most effectually done by placing one hand under the chin, and the other on the forehead; and in order to prevent interruption, the hands of the patient

should be firmly secured by an assistant on each side.

During the operation, it is of much importance for the surgeon to have his hand and arm firmly secured : For this purpose, nothing answers so well as a proper rest for the elbow, which ought therefore to be placed either upon a table, or on the knee of the operator raised to such a height that it may be nearly on a line with the eye of the patient. Practitioners usually trust to the hand being secured by the ring and little fingers resting on the cheek or temple of the patient : But this seldom proves sufficient for the perfect steadiness which operations on the eyes require ; and whoever will make trial of the mode I have mentioned of fixing the elbow, will find it preferable. It is proper, indeed, that any advantage to be derived from resting these two fingers upon the cheek should be likewise laid hold of ; but this alone should not be relied on.

An ingenious author, who has lately written on the cataract, has communica-

ted some valuable practical observations to the public *. His method of giving support and steadiness to his hand during the operation of extracting the cataract, and the same observations, I may remark, apply with equal propriety to that of couching, is to press the upper part of the arm and elbow of that hand with which he performs the operation, strongly against his own breast and ribs, and to rest his little finger about an inch from the outside of the eye, on the cheek-bone of the patient, at the same time that he retains his breath, and remains as much as possible in that situation, till the incision of the cornea is finished.—He has also invented a chair, for the purpose of fixing the head of the patient, which he has used for many years with much advantage. He very properly observes, that in the usual method of fixing the head, by pressing it against the breast

* *Vide* A Treatise on the extraction of the Cataract, by Frederick Bischoff, F. M. S. Oculist to his Majesty in the Electorate of Hanover, and to her Majesty in England.

breast of an assistant, that the least motion, even that which occurs from the assistant drawing breath, must occasion a corresponding motion of the head of the patient.—The chair that he has invented, is represented in Plate XXVIII., and it appears to be well calculated for the purpose for which it is meant.

Whether the patient is seated on this chair, or in the manner I have advised above, the assistant is now to raise the upper eyelid with the fingers of his left hand ; and the surgeon applying the groove in the upper part of the speculum, Plate XIV: fig. 1. in such a manner that it may receive the edge of the eyelid, the opening or circle formed by the brim of the speculum is to be pressed upon the ball of the eye; till the transparent cornea, and nearly about an eighth part of an inch of the sclerotica, is protruded ; by which means, if a steady and equal pressure is continued upon the eye, it will be kept firmly fixed without any injury being done to it, at the same time that a sufficient

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quantity of the ball will be left uncovered by the speculum for the purpose of the operation. ♀

I am at present supposing that the operation is to be performed upon the left eye. For this purpose, the patient being secured in the manner I have advised, the speculum being applied and secured by the surgeon's left hand, and the surgeon himself being seated, with the elbow of his right arm fixed at a proper height, he must take the couching needle in his right hand, and having fixed it, as we do a pen in writing, between the thumb and fore and middle fingers, while the ring and little fingers are made to rest upon the cheek or temple of the patient, the point of the instrument must now be made to pass the external canthus of the eye; and being brought nearly in contact with the sclerotic, it should now be quickly plunged through this coat, somewhat below the centre of the eye, and about one-tenth of an inch behind the iris. In Plate XVII. fig. 1. is delineated a needle passed into
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the eye in this manner, by which a better idea is given of the operation than can be done by any description.

In order to avoid the iris, the instrument should be introduced with its flat surface towards this membrane, and should be carried forward in a straight direction till the point of it is discovered behind the pupil, as is represented in the figure I have mentioned. By depressing the handle of the needle, the point of it will be raised, and the flat surface of it being turned downwards, it must now be pushed into the upper part of the crystalline, when the operator, by elevating the handle, must endeavour to carry the lens upon the point of the instrument down to the bottom of the eye; which will be instantly discovered, on the surgeon observing through the pupil that the cataract disappears, and by the patient becoming sensible to the impression of light.

Were we sure of the lens continuing at the bottom of the eye, the needle might now be withdrawn, and the operation

would be finished : But as we know from the anatomy of the eye, that there is a portion of the aqueous humour lodged between the vitreous humour and the iris ; as it is into this part of the aqueous humour that the crystalline is depressed ; and as this humour is of a consistence too thin for preventing the action of the muscles of the eye from raising the lens again on the pressure of the instrument being withdrawn ; we need not be surpris'd at the operation being frequently found to fail on being finished in this manner.

Instead of this, on the crystalline being pressed to the bottom of the posterior chamber, it should be slowly carried on the point of the instrument towards the outer and back part of the eye ; a movement which is best accomplished, by the operator raising his hand so as to elevate the handle of the needle, at the same time that he makes it pass somewhat outward over the cheek. In this manner, the crystalline is to be partly lodged below the vitreous humour ; which being of a firm

consistence, very commonly. prevents it from rising again; and being brought towards the external canthus of the eye, if it should afterwards be forced up by the action of the muscles, not being opposite to the pupil the passage of light to the retina will still remain clear, and vision will accordingly be no more affected than if the cataract had remained at the bottom of the eye.

As soon, therefore, as this movement is finished, the needle should be withdrawn; and there being now no further use for the speculum, it should likewise be taken off: But as it is of importance to have the eye properly fixed during the whole course of the operation, the speculum should not be removed till the whole is finished.

On the instrument being taken away, practitioners commonly try what effect is likely to result from the operation, by presenting different objects to the patient: But although no harm ensues from slight trials of this kind, they should never be carried far; for they may do harm by
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tending to promote inflammation, while no real advantage can ever arise from them.

After the operation, a compress of soft lint, soaked in a weak saturnine solution, should be lightly applied over the eye; and this being retained by the bandage, Plate XXIX. fig. 1. the patient should be confined in a dark apartment, and kept on low diet as long as there is any risk of inflammation taking place: With the view, too, of preventing this, a dose or two of a brisk purgative should be exhibited; and, when necessary, blood should be taken from the temporal artery, from the jugular vein, or from the neighbourhood of the eye, with leeches.

The eye should be looked at daily, that the real state of it may be known; but the patient, for a considerable time, should be kept in an obscure light, with his eyes sufficiently covered.

For the most part, we discover in the course of a few days whether the operation is to succeed or not, but in some instances

stances the patient remains for a considerable time perhaps equally blind as before, and yet gradually recovers the power of vision afterwards, so as to distinguish objects equally well as if the operation had proved successful from the first. This I suppose to happen from some degree of inflammation being produced in the capsule of the lens, by the violence done to it by the couching needle, and till this is entirely removed, that the effect of the operation cannot be ascertained.

On removing the coverings from the eye, if the cataract is not discovered, the object of the surgeon is completed ; but if the lens has again got into its usual situation, after a further delay for the purpose of allowing the inflammation induced by the first operation to subside, another attempt should be advised ; and a second or third I have frequently known to succeed, when the first had entirely failed : This, in a great measure arises from the circumstance to which I have already adverted, the needle being withdrawn immediately
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on the lens being pressed to the bottom of the eye; for this being done, it is in general supposed that the operation is finished. I have endeavoured, however, to show, that this is by no means the case; and that the cataract will seldom rise again if it be pressed towards the external canthus of the eye, and gently pushed beneath the vitreous humour.

Those who have not operated in this manner, will perhaps object to it, that by forcing the lens into the vitreous humour, an unnecessary violence is thus done to this part of the eye, by which it must be so much injured, as to have some influence on the success of the operation. This, however, does not on experience appear to be the case; for I have often done the operation in this manner, and I never observed any harm ensue from it. We should not wantonly hurt the vitreous humour; but we know that it is often much more materially hurt in extracting the cataract, and with little apparent detriment to the eye, than it can ever be in the operation of couching.

couching. Thus it often happens, in extracting the lens, that a considerable portion, or even the whole of the vitreous humour, is discharged, and yet the operation succeeds equally well as if no so such occurrence had taken place. This, indeed, every operator would rather wish to avoid; but it shows clearly, that no injury of importance can be done to vision by the practice I have advised, of lodging the cataract in the operation of couching, partly beneath, or even entirely in, the substance of the vitreous humour.

The operation I have described is supposed to be done, as I have already observed, upon the left eye; for which purpose the right hand of the operator must be employed: But in operating upon the right eye, if the needle is to be entered in the usual way, from the outer or external canthus of the eye, it must either be done with the left hand of the surgeon, or, if he wishes to use his right hand, he must either sit or stand behind the patient, when, by supporting the head upon his breast

breast or upon his knee, he may in this manner accomplish his purpose. This mode of operating upon the right eye has been frequently practised even by surgeons of eminence, but it is extremely awkward; and besides, the operator can never have such a full command of the eye when he sits or stands behind, as when placed before the patient. Few surgeons, however, are so alert in using their left hand, as to be able to perform with it this very nice operation; so that with the usual instruments there is no other alternative than that of doing it from behind. But in Plate XVI. fig. 4. and 5. there is delineated a form of needle, by which the operation may be done with ease and safety on the right eye with the right hand of the surgeon, whilst he is seated before and opposite to the patient. Only in this case, instead of entering the instrument at the usual place, by pushing it inwards from the external canthus of the eye, it must be entered at the internal angle, and pushed outwards, as is represented in Plate XVIII.

XVIII. fig. 1. In every other respect the operation is to be conducted as I have already directed; only, the cataract, instead of being carried to the external canthus of the eye, must in this case be drawn by the point of the needle towards the nose. In this manner the operation may be done upon the right eye by any surgeon who can perform it upon the left; an improvement that many will judge to be important.

As the operation of couching is very universally performed without the assistance of a speculum, it may be considered as an affectation of singularity to recommend one. In answer to this, I must observe, that although the cataract may be depressed without the use of a speculum, it may be done more perfectly, and with more ease both to the patient and surgeon, when a speculum is employed, than when it is not. By means of the speculum, delineated in Plate XIV. as well as with that in Plate XXII. fig. 5. the eye may be very firmly fixed, which
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allows the operator to manage the needle with more ease than can otherwise be done.

It has been commonly objected to the use of the speculum, that it does not secure the eye sufficiently; and that it always proves detrimental, by exciting inflammation over the eyeball. This observation, I believe, is well founded with respect to the instrument in ordinary use, of which a delineation is given in fig. 3. Plate XII. But it does not apply to either of the others; which, when properly fitted to the size of the eye, secure it exactly; and when finely polished, never do harm.

Some practitioners, sensible of the impossibility of fixing the eye properly in the manner commonly attempted with the fingers alone, and finding the common speculum insufficient, have proposed another instrument for this purpose: It consists of a sharp spear or prong, fixed in a handle, with a cross flat bar near the point, as is delineated in Plate XII. fig. 2.

This instrument has long been employed in some parts of the Continent: It is used by pushing the point of it through the sclerotic coat on the side of the eye opposite to where the needle is to be entered; and it is prevented from penetrating far, by the cross-bar with which it is furnished: In this situation, it is secured by an assistant on one side of the patient; and the eyelids being separated by the surgeon himself, assisted by the person behind who supports the head, the eye may in this manner be fixed in some degree, but never with so much ease and certainty as with either of the speculums I have mentioned.

Needles of various forms and sizes have been used in this operation; but the flat needle, fig. 1. Plate XV. answers the purpose better than any that I have tried. It ought not to be broader than this, otherwise it makes too large a cut in the coats of the eye; and if much narrower, it does not so readily carry the lens along with it. The round needle, fig. 2. of the same

Plate, has been much employed by many itinerants; but I have not found, upon trial, that it answers so well as the other. After piercing the cataract, it parts with it too easily: and besides, it enters the coats of the eye with more difficulty, and it cannot be so easily moved when introduced as the other; which being broad in the cutting part of it near the point, the opening formed by it in the tunica sclerotica is somewhat larger than the diameter of the rest of the instrument, which admits of its being afterwards easily moved in every direction.

It has been objected to the flat needle, that by its breadth it is more apt than the round one to hurt the iris; but with the precaution I have mentioned, of introducing it with the flat surface towards this membrane, there can never be any hazard of this. The flat part of the needle may indeed be made too broad, and this I believe is very commonly done; by which the opening made with it is too large; more irritation is thus excited; and
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when broad near the point, it does not so readily penetrate the lens as a narrow needle would do. The needle delineated in Plate XV. fig. 1. is in every respect of a proper size. Fig. 3. represents a needle with a small degree of curvature, by which I have sometimes thought that the cataract may be more easily depressed than with a straight needle ; but I have not yet used it so frequently as to be able to speak of it with decision: In piercing the eye with it, the convex side of the curve should be towards the iris, as this membrane would be apt to be injured, were it introduced in any other manner.

In describing the operation, I desired that the needle might be entered at one side of the eye, by passing it through the sclerotic coat at the distance of one-tenth of an inch from the iris. And I likewise observed, that it answers the purpose better by introducing it somewhat below the centre of the eye, than if entered, as is usually done, in a line with the centre of the pupil. It ought not, however, to be

far below this point. The twelfth part of an inch is fully sufficient; for when the needle is introduced near the bottom of the eye, the cataract is not so easily depressed with it.

It has been said by some, that the operation may be performed, not only with more ease, but with more safety, by introducing the needle through the transparent cornea, and after passing it through the pupil, to push down the cataract with the point of it to the bottom of the eye. It is not, however, probable, that this proposal can ever be generally admitted, for it is not possible in this manner to depress the lens so easily as when the needle is entered in the manner I have advised, while it can scarcely be done without hurting the iris.

§ 3. *Of EXTRACTING the CATARACT.*

THE operation of couching, or depressing the cataract, had been long practised,
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and was considered as the only means by which an opaque crystalline could be removed, till the year 1737, when an eminent oculist of Paris, Mr Daviel, first proposed and practised the method of removing it by extraction.

It is true, that several years previous to this period, Mr Petit proposed to make an opening through the transparent cornea, for the purpose of removing the lens when forced into the anterior chamber of the eye, either by accidental violence, or when pushed through the pupil in the operation of couching, an occurrence which sometimes happens : but, being considered as extremely hazardous, it was rarely practised ; nor was it ever supposed to be proper in any other state of the disease, till Mr Daviel, about the time I have mentioned, put it frequently in practice, in preference to the operation of couching. By some, the merit of this operation has been attributed to our countryman Taylor, a famous itinerant of these times ; but this will not be admitted by any who have paid attention

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tention to the history of it, given by those who had the best opportunities of being able to judge of it.

This operation consists in an opening being made through the transparent cornea, of a sufficient size for admitting the passage of the lens after it has passed through the pupil into the anterior chamber of the eye. The operation itself was nearly, if not exactly, the same when practised at first by Mr Daviel, as it is at present ; but the method of doing it then was more difficult and tedious, by a greater number of instruments being used in it than are now found to be necessary. At that period knives of different forms were employed ; as also, scissars, forceps, a lancet concealed in a canula for opening the capsule of the crystalline, as well as many others. In the present improved state of this operation, the only instruments we employ are, a speculum for fixing the eye ; one or other of the knives, Plates XVI. XXII. and XXIX. a small scoop, Plate XVI.

XVI. fig. 4. and a flat blunt-crooked probe, Plate XVIII. fig. 1.

In proceeding to this operation, the patient should be placed in the same kind of light, and secured in the same manner as I have advised for the operation of couching. The surgeon should likewise be seated in the same manner before the patient, and ought to rest his elbow either upon a table, or upon his knee raised to such a height as to bring his hand nearly on a line with the pupil.

This being done, if the operation is to be performed on the left eye, the speculum must be applied in the manner I have advised in the operation of couching, and must be pressed upon the eye with the left hand of the operator with as much firmness as is necessary for securing the eye; but more than this should be avoided, as it not only gives more pain, but is apt to press the cornea into too near contact with the iris; by which the latter is in great risk of being injured in the subsequent steps of the operation.

The surgeon is now to take the knife between the thumb and fore and middle fingers of his right hand, allowing nearly an inch to project past the extremity of his middle finger; and the point of it being brought in contact with the lucid cornea, it must be made to penetrate this coat at the distance of the sixteenth part of an inch or thereby from the iris, in a line running from the external canthus of the eye directly across the centre of the pupil, as is represented in Plate XVII. fig. 2.

The convex surface of the knife being still kept next to the iris, it must be carried slowly forward in this direction, till the point of it reaches the other side of the eye directly opposite to where it entered; and must here be pushed out till nearly a quarter of an inch of it is freely through the cornea. The operator is now, in a gradual manner, to form a semilunar cut in the under part of the cornea, by moving the knife downwards in such a manner, that all that portion of the cornea lying between

tween the point at which it entered and that at which it passed out, may be divided at an equal distance from the iris ; as is represented in Plate XVII. fig. 4. In this manner an opening will be formed sufficiently large for the passage of the cataract.

While this semilunar cut is forming in the cornea, the pressure of the speculum upon the eyeball should be gradually lessened, otherwise the vitreous humour will be forced out on the incision being finished. We are advised indeed by some to remove the speculum altogether on the knife being passed out at the opposite side of the eye ; for which purpose they leave an opening on one side of the instrument, to admit of its being taken off, as is represented in fig. 3. Plate XIV. But with an operator accustomed to the use of the speculum, there is no necessity for this precaution ; for a degree of pressure may be made with it sufficient for fixing the eye, without any risk of forcing out the vitreous humour ; and by keeping the eye fixed

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to the last, we are enabled to form the incision with more accuracy than can possibly be done when the speculum is removed early in the operation. I have seen it indeed often done in this manner; but as soon as the eye has lost the support of the speculum, the pressure of the knife is apt to draw the eyeball too much down on the under edge of the socket, by which a smaller segment of a circle is commonly formed than is sufficient for the passage of the lens; for by the eye being drawn suddenly down on the speculum being removed, the under part of the incision is almost always formed at too great a distance from the iris, and is thus made too small for the purpose.

When the eyeball has been too forcibly compressed by the speculum, the cataract, together with all the aqueous humour, and a considerable portion of the vitreous, are very commonly pressed suddenly out; but when this part of the operation is properly done, nothing but the aqueous humour passes out.

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As soon as the incision is finished, the operator must lay aside the knife ; and having lifted the flap formed in the cornea with the flat crooked probe, Plate XVIII. fig. 5. the point of it should be passed through the pupil, in order to scratch an opening in the capsule of the lens ; or this may be done with the instrument represented in Plate XXIV. fig. 2. & 3. This being accomplished, the cataract will either pass out at the cut in the cornea, by the action of the muscles of the eye ; or when this does not happen, it must be forced easily out by very moderate pressure, applied over the globe of the eye with the finger.

It happens indeed in some instances, that a good deal of pressure is required to force the cataract out : But this always proceeds from some fault in the previous steps of the operation ; almost universally indeed from the cut in the cornea being too small, by which the lens is with difficulty forced through the pupil ; or if it is made to enter the anterior chamber of the eye, it

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does

does not pass through the opening in the cornea with such ease as it ought to do.

In this situation, it is the common practice to force out the lens by repeated applications of pressure. This, however, ought never to be done; for nothing proves more destructive to the eye than violence applied to it in this manner: For besides the loss of the vitreous humour with which it is commonly attended, the iris is often materially hurt, and much inflammation induced by it.

When the lens cannot be easily removed from the anterior chamber of the eye by means of a scoop, and in every instance where it is with difficulty forced through the pupil, the operator, instead of persisting to employ much pressure, should rather enlarge the opening in the cornea, using for this purpose small probe-pointed scissors; and this being done, the operation falls to be finished in the manner I have already advised.

With a view to render the passage of the lens as easy as possible, the pupil should at
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this part of the operation be in the state of the most perfect dilatation ; for which purpose, after the incision of the cornea, and the opening of the capsule of the crystalline are completed, a dark cloth or curtain may be placed between the eye and the light, to be removed on the lens passing out ; or the patient may be placed with his back to the window.

In a few instances of cataract, the cause of opacity is not found in the lens itself, but in its capsule : In this case, the extraction of the lens answers no good purpose, as the opacity is equally strong after the operation as it was before. Some authors have therefore in such circumstances advised the opaque capsule to be removed with forceps and other instruments passed through the pupil ; but this can never be done but with much risk of destroying the iris, and doing much injury to other parts of the eye : It ought never therefore in my opinion to be attempted : We should rather trust to time, and an antiphlogistic regimen, for the removal of the opacity ; from
which

which no harm can ensue, and I have known instances of cures being performed by it : whereas the forcible extraction of the opaque capsule, so far as I have yet heard, has never in any case effected a cure ; and it has frequently destroyed the eye entirely.

When, again, the operation is to be performed upon the right eye, if the surgeon wishes to do it in the usual way with the knife commonly employed, he must use his left hand ; but as few practitioners are able to perform this nice operation with the left hand with sufficient steadiness, I have delineated a knife, fig. 2. Plate XVI. by which it may be easily done with the right hand, while the patient and surgeon are sitting opposite to each other in the manner I have mentioned : only, in this case, the point of the knife must be entered at the internal canthus of the eye, and must then be pushed out to the opposite side, instead of being introduced at the external angle, and carried towards the nose.

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The operation being finished, the eye should be immediately covered with a compress of soft lint, or old linen, soaked in a weak saturnine solution, to be retained by the bandage, fig. 3. Plate XXIX. or any other that does not compress the head much, or keep it too warm. For several days after the operation, no light should be admitted to the patient's apartment. A very low diet should be advised: And the eye being very apt to inflame, repeated blood-lettings are frequently requisite from the jugular vein or temporal artery.

As this operation indeed is more apt to fail by the subsequent inflammation of the eye than from any other cause, it requires our utmost attention to guard against it: And as the healing of the incision depends in a great measure on the eye being kept at rest, every cause of irritation should be avoided. When the operation succeeds, the incision is in general cured in fourteen or fifteen days; but in some instances it continues open for several weeks.

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In describing the operation, I have noticed an occurrence that is apt to happen, when every part of it is not done with caution, and which commonly proves very alarming; namely, the loss of a considerable part, or perhaps the whole, of the vitreous humour. By this the eye becomes flat, and instantly sinks within the orbit: But although it ought to be guarded against with the nicest attention, it does not always prevent the success of the operation. I have known indeed some instances of the eye remaining sunk and useless after this accident, but most frequently the globe begins soon to fill again, and in the course of two or three weeks it has commonly acquired its usual bulk.

Whether this takes place from a regeneration of the vitreous humour, or merely from the ball of the eye being all filled with an aqueous secretion, I will not pretend to say. The latter is the common opinion; but why may not the vitreous humour be renewed as readily as the other? I am inclined to think that a renewal of
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the one happens as readily as that of the other, from having often observed as perfect a state of vision after this operation, where all the vitreous humour had been lost, as if none of it had been discharged ; of which a remarkable instance occurred in a woman who some time ago had the operation performed upon both eyes. The eyes were otherwise both apparently sound : In one, the whole of the vitreous humour was forced out along with the cataract, and the eye sunk entirely to the bottom of the orbit ; in the other, the operation was performed with much accuracy ; the cataract was extracted, and none of the vitreous humour escaped. In the course of three or four weeks, however, from the operation, both eyes were of the same bulk ; their appearance was perfectly similar, and the patient discovered objects equally well with each of them. This does not indeed determine the point with certainty, as it may be alleged, that the figure of the eye being preserved by the aqueous humour, the effect produced upon

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vision by the loss of the vitreous humour cannot probably be great; but we can scarcely suppose that any part of such an important organ has been formed in vain.

I shall now offer a few observations on the instruments employed in this operation. Knives of various forms have been proposed for it; but those delineated in Plate XVI. have been most generally used; and of these fig. 1. and 3. are the best: The first I have used successfully in various instances; and the latter, which I now believe to be the best that has yet been proposed, is the knife of the ingenious Dr Richter of Gottingen. The shape of the first is nearly that of a spear-pointed lancet; only the back of it is blunt, excepting a fourth part of an inch or thereby near the point, which should be sharp on both edges; and that side of the knife which passes next the iris should be somewhat round, while the other is nearly or altogether flat. By this we prevent, as much as possible, any risk of hurting the iris,

iris, which is apt to happen with a knife that is flat on both sides, and with both edges sharp through its whole length. The operation has frequently indeed been performed with this kind of knife, but it is done with more safety with the one I have mentioned. We ought however to take care, that while a knife for this purpose should be extremely sharp and finely polished, it ought likewise to be firm; for the cornea being both thick and firm, it is more difficult to pierce than those who are not accustomed to this operation are apt to imagine, and who are therefore disappointed at finding the instrument in ordinary use too fine. It should be at least as firm as a common lancet.

For the purpose of opening the capsule of the lens, nothing answers better than the flat curved probe delineated in Plate XVIII. fig. 5. The instrument commonly used for this is represented in Plate XXIV. fig. 2., but we incur with it a greater hazard of hurting the iris. But whatever instrument is employed, it should be passed

through the pupil with much steadiness, otherwise the iris may be readily injured, of whatever form it may be.

I have thus described all the steps of the operation as it is now practised, with such improvements as it appears to admit of: But as it is an operation of much importance, and liable to different objections, even in its present improved state, I have been led to consider it with more than ordinary attention, and to make experiments upon different animals with a view to obviate these; the result of which I shall now shortly relate, although I did not think it proper either to place any weight on them, or even to mention them in the description of the operation; for, till confirmed by experience upon the human body, no conjecture, however well founded it may appear to be from experiments on other animals, should be allowed to have much influence on our opinion.

The most material objections that occur to this operation are these:—The vitreous
humour

humour is apt to pass suddenly off along with the cataract ; by which the eye is in some instances sunk so much as never to recover its form again :—The incision being made in the transparent part of the eye, the cicatrix which ensues is frequently so extensive as to obstruct the rays of light in their passage to the retina ; by which vision is often as effectually obscured, as if the cataract had not been extracted :—And lastly, the lens being often too large for passing through the pupil, the iris is frequently much injured by this part of the operation, when in every other respect it is perhaps very properly performed.

In regard to the first of these, it may be alleged, that it does not occur when the operation is properly done ; and that it cannot with propriety be stated as an objection, merely because it frequently happens from awkwardness or inattention in the operator. It is, however, so frequent, that whatever can tend to prevent it, must

be considered as a very material improvement.

This, I think, may be in some measure done, by the incision being made in a different part of the cornea. When an opening in the cornea is made, as in the usual way of performing this operation, the most depending part of it, all the aqueous humour is instantly discharged, which the vitreous humour is deprived of support at its anterior surface; so that a pressure made upon the ball of the eye by the speculum, or even by the natural action of the muscles of the eye, is very apt to force it out. Instead of this, by making the cut in the upper part of the cornea, the lens may be extracted with ease, while a considerable part of the aqueous humour being still retained by the inferior half of the cornea remaining entire, the vitreous humour is neither so suddenly nor so entirely deprived of the support which it affords, and does not escape so readily as in the ordinary method of performing the operation. At least, this

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have found to happen in other animals ; and there is reason to imagine that it will likewise be the case when the operation is done on the human eye.

It is also probable, that another advantage may be derived from the incision being made in the upper part of the cornea. One material objection to this operation, when done in the usual way, arises, as I have already observed, from the cicatrix induced by the incision on the cornea. The same extent of the cornea will no doubt be cut, when the operation is performed in the manner I have mentioned ; but the cicatrix being in the upper part of the eye, it will not probably prove so hurtful, as it is of most importance for objects to be seen distinctly that lie beneath the eye. We frequently find that patients who have undergone this operation, see every object more distinctly, when placed above the eye, than when viewed beneath it ; a circumstance that cannot in any other manner be so well explained.

The upper part of the cornea is cut with the same ease as the under part of it ; the same instruments being employed, and the surgeon, patient, and assistants, being placed in the same manner : Only in this case the knife must be introduced with the cutting edge of it towards the upper part of the eye, the incision being to be extended in this direction : And as the under half of the cornea remains undivided, the lens, on passing through the pupil, being apt to be retained by the flap, must be cautiously removed, either with the scoop, Plate XVI. fig. 4. ; with a small sharp hook, Plate XVIII. fig. 2., or with the small forceps, fig. 4., which were made for this purpose when I was engaged in the experiments that I have mentioned.

In this manner the two first objections to this operation are in some measure removed ; and from all the observations that I was able to make of it in the course of the experiments to which I allude, I think it probable that it will answer in every respect better than any other that has yet been

been proposed ; but as I have never put it in practice in the human eye, I cannot speak of it with decision ; and I propose it only as a hint for future observation.

But although we may by this means prevent the escape of the vitreous humour, and may in some measure avoid the bad effects that usually result from the cicatrix after this operation, yet the third objection remains in equal force against it ; the cataract must necessarily pass through the pupil, and in doing so the iris is often irreparably hurt.

As this renders the operation much more hazardous than it otherwise would be, it has always appeared to me that it would be a very important improvement of this operation, to extract the cataract in any other manner that would not expose the iris to this hazard. This we may do by opening the eye behind the iris, instead of making the incision in the usual place in the lucid cornea ; and it would be attended with this advantage, that no inconvenience would ensue from the cicatrix.

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In this manner I have frequently performed the operation on other animals ; but it has never, so far as I know, been put in practice on the human eye. The objections which occur to it are, that the opening being made in the sclerotica, the inflammation induced by it must probably be great ; and this coat of the eye being thicker than the transparent cornea, wounds made in it are commonly supposed to be more difficult to heal. In some experiments, however, which I made upon rabbits, with a view to determine this point, no reason appeared for this conclusion. The inflammation induced by an opening made in the sclerotica was not more considerable ; nor was the cure in any respect more difficult than when the operation was done in the usual manner.

If the operation is ever performed in this manner, the opening should be made in the upper part of the eye, by entering the point of the knife about the tenth part of an inch or thereby behind the
transparent

transparent cornea ; and the incision being made of a sufficient size for allowing the cataract to pass, the sharp hook, fig. 2. Plate XVIII. should be introduced, with a view to extract it. As the point of the instrument is extremely sharp and fine, it penetrates the lens with ease, and in this manner it may be removed without making any pressure on the eye.

Having thus finished the consideration of the two operations of couching and extracting the cataract, before concluding the subject, I shall offer a few observations on the comparative advantages that result from them ; and shall, at the same time, mention those reasons by which I have been induced to prefer the one to the other.

§ 4. Comparative View of the respective Advantages and Disadvantages of the Operations of Couching, and extracting the Cataract.

THE operation of couching, or depressing the lens, was the first that was practised for the cure of the cataract. The extraction of the lens was afterwards proposed, as a more certain means of removing the disease. Both methods have had their abettors, and much has been said in favour of each. To appreciate, therefore, the merits of these operations, and to ascertain that by which our intention may be accomplished in the safest and easiest manner, are objects meriting particular attention.

It has been objected to the operation of couching, 1. That it frequently fails from the cataract rising again into its usual situation. 2. That it must always fail when the lens is in a soft or liquid state, by the fluid

fluid contained in the capsule dispersing through the eye when the capsule is opened by the couching needle. And, lastly, When the opacity lies in the capsule, and not in the lens, that it cannot be cured by couching.

With regard to the first of these, it must be acknowledged, that the cataract frequently rises again after having been depressed to the bottom of the eye: But when the lens, instead of being pushed down immediately behind the iris, is carried, as I have directed, by the point of the needle towards one angle of the eye, and lodged partly beneath the vitreous humour, it never rises again; and even where the operation fails through the fault of the surgeon, or from any other cause, the pain attending it is so inconsiderable, that few patients will refuse to have it repeated once or oftener; and I have seldom known it fail, where this has been done.

The second objection may appear of more importance to those who are not accustomed to this operation, but it is not so

in reality. A cataract in a fluid state, and spreading over the eye immediately on the capsule being pierced with the needle, is not a common occurrence; from my own observation I would say, that it does not happen more than once in twenty times: But were we even to meet with it more frequently, so far from stating it as an objection to the operation, we should rather consider it as an advantage. In this case the violence done to the eye is not so great as when the operation of couching becomes necessary in all its parts from the cataract being of a firm consistence; a repetition of the operation can never be requisite; and the milky whiteness communicated to the aqueous humour by the dispersion of the liquid crystalline through it, commonly disappears in a short time after the operation. At least that it commonly does so, is consistent with my own experience; and the observation is confirmed by the testimony of others, particularly by that of the late Mr Pott, on whose authority we may rely with confidence.

Nay,

Nay, further, even when the cataract is firm and entire, if completely separated from its capsule by the couching-needle, it almost always dissolves in the aqueous humour, without leaving any vestige of opacity; an observation much in favour of the operation of couching, as it obviates the objection founded on the rising of the cataract after it has been depressed: It shews, at the same time, that there is little or perhaps no reason for ever putting in practice the proposal of Mr Petit, for removing a cataract which in couching may have been accidentally pushed into the anterior chamber of the eye, as time will, in most instances, accomplish without pain or hazard what cannot be done by Mr Petit's method but at the expence of both.

The lens appears to dissolve in the aqueous humour sooner or later, according as it is more or less firm when separated from its capsule. The opacity produced by the dispersion of a fluid lens in the aqueous humour, commonly disappears soon after the operation: Cataracts of a firmer consistence

istence are seldom altogether dissolved in less than several weeks ; in many a small portion of a depressed cataract is observed in an undissolved state a good many months after the operation, and in a few after several years have elapsed ; but this is a rare occurrence.

The third objection, of which I took notice, the alleged impossibility of removing the disease by couching when the cause of the opacity lies in the capsule, and not in the lens, seems *à priori* to be the most conclusive against this operation ; but it will not on examination be found to be so. In the first place, this variety of cataract is rarely met with : It occurs occasionally, but by no means so frequently as to lead us to prefer one mode of operating to another for this reason alone.

Secondly, I have already observed, that this variety of cataract cannot be cured even by extraction. The opaque capsule may indeed be forcibly torn away with instruments passed through the pupil, but
not

not without doing such violence to the eye, as must in a great proportion of cases, probably in every instance, be productive of certain blindness. I may therefore, without hesitation, predict, that although this operation may be performed from time to time by those who are fond of innovation, and who wish to shew their dexterity at the expence of those intrusted to their care, that it will never be generally practised. I have seen it done by some of our most expert oculists, but in every instance the eye was completely destroyed by it, while the inflammation which it served to excite never failed to prove uncommonly severe.

Besides, although I will not say that this variety of cataract can in every instance be removed by couching, yet an attempt towards it may be made with perfect safety, by endeavouring to separate and depress the capsule with the point of the needle. If this can be done, the operation will prove as successful as if no such cause of disease had subsisted: And when

it happens to fail, provided the trial is made with caution, no detriment will ensue.

Besides these objections, it has been said, in opposition to the operation of couching, that the pain and inflammation that attend it, are frequently greater than what arise from extraction; and that the vitreous humour is more apt to be deranged by the needle in couching, than by the other method of operating.

But neither of these assertions will be admitted by those who have had sufficient opportunities of putting both operations in practice. They know, that in general the symptoms of pain and inflammation arising from the extraction of the cataract are more considerable than those that proceed from couching; and it must be acknowledged by all who speak impartially, that the operation of extraction is more frequently attended with the loss of some part, or perhaps of the whole of the vitreous humour, than that of couching can in any material degree tend to derange it.

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We have thus seen, that the several objections stated to the operation of couching, are not well founded:—That the cataract can be removed by it as effectually as by the operation of extraction:—That it is attended with less pain, and less subsequent inflammation; while at the same time, it never can occasion those deformities that arise from a large cicatrix on the cornea, or from the sinking of the eyeball, which sometimes occurs from the loss of the vitreous humour.

But these circumstances alone should not be allowed to decide a question of such importance: The ultimate and permanent effects of the two operations ought alone to have weight on our opinion. Now, from much observation, it appears clearly to me, that the operation of couching proves upon the whole more successful than the other; that is, vision is as perfectly restored by couching, and, *cæteris paribus*, a greater proportion of those who submit to it receive benefit from it, than

of those who undergo the operation of extraction.

With those who have not had frequent opportunities of observing the consequences of extraction, it proves always a very deceiving operation. The removal of the cataract is in most instances attended with an immediate return of vision, much to the satisfaction of both the patient and operator; but, in a great proportion of cases, even of those which at first have every appearance of proving successful although vision may be tolerably perfect for some time, perhaps for several weeks or even for months; yet it generally grows more indistinct, till at last the patients become altogether blind. This is the result of my observation; and it corresponds with the event of the operation when performed by various good operators.

The late Dr Young of this place, who practised surgery for a considerable time with much reputation, had at one period a very high opinion of this operation. In
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the second volume of the Edinburgh Physical Essays, he gave an account of his success in six cases in which he had operated a few months before, and which, at the time of writing the paper, appeared to be remarkably great: But in a conversation with the Doctor on this subject a good many years afterwards, I found his opinion much changed. The Doctor's observations on the consequences of extraction were exactly similar to those that I had made on it. In the greater number of patients upon whom he had operated, vision was restored immediately on the removal of the cataract; but in nearly the whole of them the sight began to be impaired in a few months from the operation, and became gradually worse, till total blindness at last was produced.

The progress of the loss of that degree of vision which is restored by the extraction of the cataract, is marked by the following appearances. Some degree of immobility is at first observed in the pupil:—It remains inactive when the eye is ex-

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posed

posed to light:—It gradually becomes smaller; and at last it is found too much contracted, as scarcely to be capable of admitting a crow's quill. It now remains immovable to whatever light it may be exposed, and the eye is often reduced to a worse state than it was in before the operation, being incapable of distinguishing light from darkness.

This unfavourable event appears to proceed from the violence, which, in the course of the operation, is done to the iris; which is well known to be a membrane of the most delicate texture, as the pupil through which the cataract is forced is never sufficiently large for admitting the lens to pass with ease, and accordingly is seldom extracted but with injury to this very nice and useful part of the eye.

It may be said, that the violence done to the iris should produce an immediate effect; and that vision, if not lost by it at first, should not afterwards

fect. In various cases, the iris is torn in different places, and appears to be irregular in its contraction and dilatation from the time of the operation being performed: But although in these, as well as in other instances where the pupil is only overstretched, blindness does not take place immediately; yet it is almost as certainly to follow, as if it had been instantly produced. The reason of this it is perhaps impossible to explain; but, in the course of my observation, the fact has been exactly what I have mentioned.

Proceeding upon the idea of the failure of this operation depending in a great measure upon the injury done to the iris by the passage of the cataract, and being anxious to improve an operation for which at one time I had a great partiality, I have offered a proposal for this purpose.—By making the opening in the eye behind the iris, in the manner I have proposed, this inconvenience may be avoided; but whether this mode of operating will be found

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to succeed or not, future experience alone must determine.

In the mean time, till the operation of extraction is so far improved as to obviate the bad effects that I have pointed out, the method of cure by depression I shall continue to prefer, as being more easily performed; less apt to injure the other parts of the eye; and in most instances productive of more real advantage.

S E C.

SECTION XVIII.

Of the FISTULA LACHRYMALIS.

A SINUOUS ulcer, with hard or callous edges, is in general termed a Fistula; but authors, in treating of diseases of the lachrymal passages, have affixed a different meaning to this term: Every obstruction to the passage of the tears from the eye to the nose, is commonly, though improperly, denominated a Fistula Lachrymalis. A sinus in these parts, attended with callosity, ought alone to receive this appellation; but as some confusion might arise from any innovation that could be proposed, I shall avoid, as I have hitherto done, any attempt towards it; and shall endeavour to describe, as clearly as possible, the various appearances which the disease in its different stages is known

known to assume, under the general denomination of *Fistula Lachrymalis*.

An anatomical description of the eye having already been given in the second Section of this Chapter, I shall now refer to what was then said of the parts concerned in the disease that we are now to consider. An accurate delineation is likewise given of these parts in Plate XII fig. 1. *b* represents the puncta of the two lachrymal ducts, by which the tears are carried from the eye to the sac *c*; from whence they are transmitted by a canal which passes in an oblique direction through the *os unguis* into the nose where it terminates below the *os spongiosum inferius*. I formerly remarked that the *os unguis* is divided longitudinally by a kind of ridge, which at this part forms the boundary of the orbit; and it is necessary to observe, that the groove in this bone, through which the nasal duct of the lachrymal sac runs, lies altogether exterior to the orbit, being separated from it by this ridge of the *os unguis*.

This short recapitulation of the anatomy of the lachrymal passages, will render the description now to be given of the diseases to which they are liable more intelligible.

The fistula lachrymalis arises, as I have already observed, from obstruction to the passage of the tears into the nose; but the disease assumes a variety of appearances, according to the seat of the obstruction, and to the effects which it excites on the neighbouring parts. Thus we may readily suppose, that the symptoms produced by obstruction in the puncta lachrymalia, or in the ducts leading from these to the sac, will be widely different from those which arise from obstruction in the lachrymal sac itself, or in the duct leading from this sac to the nose. And again, we might, *à priori*, conclude, that the appearances induced by a recent obstruction of any of these passages, must probably be very different from those which take place after a long continuation of the disease.

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The lachrymal puncta and ducts are apt to be obstructed by burns, wounds, or whatever excites inflammation in any part of them, and when the tears are thus prevented from passing into the nose, they necessarily fall over the cheek, and where they do not become acrid, so as to excoriate or fret the neighbouring parts, this discharge of tears is almost the only symptom which this variety of the disease ever excites: A dryness indeed takes place in the corresponding nostril, by the want of this secretion which used to be poured into it; but this inconvenience is never of much importance.

It is this variety of the disease only which ought to be termed Epiphora, or a watery or weeping eye; for when the obstruction is seated in any other part of the lachrymal passages, the disease that ensues is attended with very different symptoms.

When the lachrymal puncta and ducts remain open, if obstruction takes place either in the under part of the lachrymal
fac,

sac, or in the duct that leads from it to the nose, the first warning that the patient receives of it is a small tumor that forms in the internal canthus of the eye, that disappears on being compressed, by a plentiful flow of tears passing into the eye, and from thence over the cheek. In this incipient state of the disease, some portion of the tears frequently passes into the nose on the sac being compressed; a circumstance always to be considered as favourable, as it shows that the obstruction is not altogether complete.

If the tears are regularly pressed out before the tumor becomes large, and before they have remained in the sac so long as to become acrid, they are usually clear, and of a natural appearance when forced out from the puncta; and, from the resemblance which this fluid bears to the contents of hydropic collections in other parts of the body, this stage of the disease has been termed a *Dropsy of the Lachrymal Sac*; a distinction, however, of no real importance.

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When in this state of the obstruction the patient is attentive to a proper and frequent application of pressure, and does not allow the lachrymal sac to be over-distended, a complete cure may either be obtained, or the disease prevented from giving much uneasiness; at least this is always the case so long as the tears retain their natural appearance, and while a considerable proportion of the contents of the tumor can be pressed into the nose.

It most frequently happens, however, from the patient being inattentive to the state of the sac, and allowing it to be over-distended, that this most simple state of the disease proceeds in a gradual manner to turn worse:—The passage into the nose becomes completely obstructed:—The swelling in the corner of the eye acquires a greater bulk, but still retains the natural appearance of the skin:—The tears are now with difficulty pressed out, and are observed not to be transparent, but mixed with a proportion of a thick, opaque, whey-coloured mucus, somewhat similar

similar to, but when minutely examined found to differ considerably from, purulent matter.

Even in this stage of the disease the patient seldom suffers much pain, or any farther inconvenience than that which results from the flowing of the tears and mucus over the cheek: at last, however, the tumor begins to inflame, to become tense, red, and painful to the touch; and the matter pressed out from it has now a more purulent appearance.

At this period the tumor is exactly similar to a common boil or abscess; and by those not versant in this branch of practice, it is frequently considered as such. It becomes gradually more inflamed and more tense, till the teguments at last burst, and form an opening in the most prominent part of it, at which the tears and matter contained in it are now altogether discharged.

When the opening thus formed is small, it commonly heals in the course of a few days; but it bursts again as soon as any considerable

considerable quantity of tears and mucus is collected ; and continues thus to collect and burst alternately, till the opening becomes sufficiently large to prevent any farther collection from taking place.

This state of the disease exhibits exactly the appearances of a sinuous ulcer, with callous, and sometimes with retorted, edges, constituting what is properly termed the *Fistula Lachrymalis*. Tears, mucus, and purulent matter, are now abundantly discharged from the sore. When the bone beneath is found, this discharge is seldom either acrid or offensive to the smell ; for the opening being in general in the under part of the tumor, the matter is discharged almost as speedily as it is formed ; but when any of the contiguous bones are carious, they are not only found to be so by the introduction of a probe, but by the appearance, smell, and effects of the matter upon the neighbouring parts. In this case, it is thin, fetid, and commonly so acrid as to fret and corrode the teguments most contiguous to the ulcer :

And

And when the disease is connected either with scrofula or lues venerea, an occurrence by no means unfrequent, the discharge and appearances of the fore are different according as it happens to be combined with one or other of these diseases.

I have thus described the different symptoms of this disease, and the progress which it usually makes from the first formation of obstruction in the lachrymal passages, to its last or ultimate stage; and it is highly necessary that practitioners should be acquainted with the different appearances which the various states of it afford; for the method of cure best suited to one period of the disease, is frequently unfit for, and indeed altogether inadmissible in, others.

From the history that I have given of the rise and progress of this disease, it is evident, that in every instance it originates from obstruction in some part of the lachrymal passages: The cure must therefore depend upon the removal of this obstruction; but the means of effecting this

will vary according to the nature of the cause by which it is produced, and to the particular stage of the affection, as well as of the part in which it is seated: Our prognosis must likewise be directed by attention to these points; for we may readily conceive, that a cure will be more easily and more certainly obtained in the case of a recent obstruction, where the bones are yet perfectly sound, and where there is no suspicion either of scrofula or lues venerea, than in opposite circumstances. When the obstruction is induced by the venereal disease or by scrofula, and especially when the os unguis and other contiguous bones have become carious, nothing will answer the purpose till the general taint of the constitution is removed; and even then a weeping eye or a frequent flow of tears over the cheek very commonly ensues, and can never in future be removed. But when the fistula lachrymalis arises, as it most frequently does, from inflammation of the lachrymal passages, induced either by cold, by the measles,

measles, or any inflammatory affection to which the eyes are liable, if it has not continued so long as to hurt the bones beneath, we may in general give a favourable prognosis: For in such circumstances, a due perseverance in the means to be now pointed out, though not always, is yet very commonly attended with an entire removal of the disease.

Again, when obstructions are induced in the lachrymal canals by tumors in the contiguous parts, which they sometimes are, particularly in cases of polypi in the nose, where the tumor by pressing upon the inferior extremity of the nasal duct is apt to produce a stoppage to the flow of tears, the prognosis must in a great measure depend on the practicability of removing the excrescence; for till this is accomplished, nothing effectual can be done in the treatment of the fistula lachrymalis.

The lachrymal sac and ducts are lined with a mucous membrane, similar to the membrane that lines the nose; with

which it is connected, and of which indeed it appears to be a continuation. In a healthy state of these parts, the nasal duct of the lachrymal sac will easily admit a crow's quill; a size perfectly sufficient for allowing a free passage of the tears into the nose: But when this membrane that lines the duct becomes inflamed, as the fulness which this excites must diminish the diameter of the canal, obstruction proportioned to the violence of the inflammation must necessarily ensue.

I particularly mention the nasal duct, as it is in this duct that the obstruction producing the most frequent variety of the disease is seated, owing to its near contiguity to the nose; by which, in cases of catarrh, inflammation is apt to be communicated to it from the membrane of the nose: But obstruction to the flow of tears into the nose will just as certainly take place from inflammation seated in the ducts leading from the eye to the lachrymal sac; and the principles upon which the
method

method of cure proceeds must be nearly the same in both.

When the disease proceeds from inflammation, we should depend chiefly on such remedies as prove most effectual in inflammatory affections of other parts of the body. General and local blood-letting should be prescribed in quantities proportioned to the strength of the patient, together with laxatives and a low diet ; and a saturnine solution should be applied to the part affected, either in the form of a poultice, or with compresses of soft linen. In this manner, when the means are timously employed, and duly pursued, obstructions arising from this cause are frequently removed ; but when the parts have been long in an inflamed state before any remedies were used, it often happens that a cure cannot afterwards be accomplished even by the most complete removal of the inflammation : For, as inflamed parts, when kept long in contact, are every where apt to adhere, so the sides of the lachrymal passages, when much inflamed, very rea-

dily unite together ; by which a very obstinate variety of the disease is produced ; and which shews, in a strong point of view, the propriety of treating every affection of this kind with the utmost attention from the beginning : By which we frequently have it in our power to prevent the formation of this obstruction, and which nothing but a painful operation can afterwards remove.

When the obstruction is seated in the puncta lachrymalia, or in the ducts leading from these to the sac, and when it is found to continue after the inflammation which gave rise to it is removed, we sometimes succeed in removing it by inserting a small probe into each punctum, so as to pass it along the course of the ducts into the lachrymal sac. In this manner the opening may be rendered pervious, and be afterwards preserved by injecting, twice or thrice daily with a small syringe, a weak solution of alum, saccharum saturni, or white vitriol ; and by keeping at other times small silver or leaden probes constantly

stantly inserted, till the sides of the ducts become callous, the tears will thus find a free passage to the sac, by which a cure will be obtained. *

This is no doubt a very nice operation; but whoever is versant in the anatomy of these parts, and accurately acquainted with the course of the lachrymal ducts, may, in the course of a few trials, be easily able to perform it. The probes represented in Plate XXI. figs. 5. and 6. and the syringe and small tubes in Plate XX. figs. 1. 5. and 7. are the instruments to be employed for it.

In obstructions of these ducts, it has been likewise proposed to pass a small cord or seton from the puncta through the lachrymal sac into the nose, and to allow it to remain till the passage becomes callous. But, besides the difficulty of effecting this, there is much reason to think that it would do more harm than good, as the smallest cord that we could pass would create much inflammation and pain.

The obstruction, however, is most frequently seated in the duct leading from the sac to the nose, forming a variety of the disease that requires a more complex method of treatment. When induced by inflammation, a strict antiphlogistic course, such as I have mentioned, will frequently remove it ; but when this happens to fail, either from the disease having been improperly treated from the first, or from any other cause, other means should be employed. I shall therefore suppose, that all symptoms of inflammation are removed ; but that the nasal duct still remains obstructed ; that it is attended with a slight tumefaction in the internal canthus of the eye, along with a frequent flow or discharge of tears over the cheek ; and that the skin covering the tumor still retains its natural appearance.

This is the most simple stage of the disease. It is neither attended with pain nor with much deformity or inconvenience ; and with a moderate share of attention on the part of the patient, the aid of a surgical
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cal operation may be rendered unnecessary: By compressing the lachrymal sac from time to time with the finger, the contents of it are discharged before they become acrid; and although this does not accomplish a cure, it in general renders the disease very supportable; so that in this stage of it, so far as I can determine from my own experience, nothing further should be attempted. Various means have indeed been proposed for effecting a complete cure of this stage of the disease, but being all tedious and painful, and not by any means certain, as long as a watery or weeping eye is the only inconvenience that occurs from it, a prudent practitioner will rather advise a patient to submit to this, than undergo the pain, confinement, and uncertainty, of a nice operation. As a fresh attack of inflammation would be apt to render the disease worse, he will advise him to avoid exposure to cold, and whatever might tend to induce an inflamed state of the eye and neighbouring parts; and, in the mean time, he will desire him
to

to trust to gentle pressure alone for obviating any effects that might ensue from the obstruction.

For the purpose of applying pressure to the lachrymal sac, various machines have been invented; the most convenient form of which is represented in Plate XIX. fig. 1. by which any necessary degree of compression may be continued with ease and without interruption. But, as we are now supposing that the nasal duct of the lachrymal sac is completely obstructed, and that no part of the tears can be forced into the nose, no benefit can be derived from a continued course of pressure; and as any advantage to be obtained from the practice is found to accrue with equal certainty from the finger being applied from time to time on the course of the sac, I have always, in this stage of the disease, been accustomed to depend upon this alone.

The other means that have been recommended for the cure of this stage of the fistula lachrymalis, are, the introduction
of

of a probe into the nasal duct of the lachrymal sac, with a view to remove the obstruction:—The injecting of water, or any other mild liquid, for the same purpose:—And, lastly, it has been proposed to introduce a quantity of quicksilver into the sac, through the lachrymal puncta, the weight and fluidity of which being supposed well fitted for making it pass through any ordinary degree of obstruction.

Mr Anel, a French practitioner, was the first who brought to perfection the method of introducing a probe, or the point of a syringe, into the lachrymal sac: but although an accurate knowledge of the anatomy of these parts may enable any one to perform it in a sound or pervious state of the lachrymal passages, yet in an obstructed state of the nasal duct it can scarcely be done; and, even when effected, it is not found that so much benefit is derived from it as at first there might be reason to expect.

Two modes are proposed for effecting this operation: In the one, a small probe,
or

; derived from the practice, much mischief is apt to ensue from it.

The proposal of curing this disease by injections, is very ingenious ; but, for reasons I have given, it will seldom, I imagine, be of much real utility. We are told, that it will often answer in cases of inflammation ; and that all the pain and uncertainty of the ordinary means of cure may thus be avoided. But when the obstruction is completely formed, it is altogether inadmissible, from the impossibility of introducing a probe ; and whenever the stoppage of the tears is only partial, there will be much risk of doing more harm than good, by the irritation, pain, and consequent inflammation, which this operation never fails to produce. In such circumstances, the patient should rather submit to any inconvenience arising from the disease, than to uncertain trials of this kind.

For the same reasons that the passing a probe, and of injections, into the chrymal passages, can seldom if ever prove useful

useful, the introduction of quicksilver into the lachrymal sac will likewise probably fail: Where obstruction is already formed, it will not be able to remove it; and unless obstruction takes place, no attempt of this kind is indicated. The practice, however, is ingenious; and as it may be done with more ease, so it is less exceptionable than the use of probes or injections.

In the early stages of the obstruction, I have frequently passed injections from the puncta lachrymalia into the nose; but although this proved always satisfactory at the time, it has not been attended with any real advantage; for although I have now done it in upwards of fifty instances, and in many of these liquids were daily passed along the lachrymal passages for several weeks together, yet in none has the disease been removed by it.—The liquids that I employ, are warm-water, rose-water, and weak solutions of saccharum sa-

I have thus described the modes of treatment to be advised in this the most simple form of the disease; but I must again observe, that as long as a watery or weepy eye, with perhaps a slight occasional faction in the internal canthus, is only an inconvenience that it excites, nothing should be advised but the application of moderate pressure from time to time with the finger.

But whenever the disease arrives at such a height as to produce either much pain or deformity, a different treatment is required. When the tumor in the angle of the eye becomes large, inflamed, and painful, as the collected matter soon turns sharp and acrid, the contiguous bones are apt to be injured, if the matter is not quickly discharged.

In such circumstances, a person not acquainted with the anatomy of the diseased parts, and with the cause of the tumor, would be induced to trust entirely to an opening being made in it sufficient for discharging

charging the matter : For in this state of the disease, it assumes exactly the appearance of a common boil or abscess ; and therefore this method of treatment might be considered as sufficient. But although some temporary advantage might thus be derived from the discharge of the matter, as the cause of the tumour would not be removed, a permanent cure it is evident would not ensue. We are here supposing that the disease originates from obstruction in the nasal duct leading from the lachrymal sac. It is clear, therefore, that the sac only being laid open, will be attended with no further benefit than that of producing an immediate discharge of its contents ; for while the tears are conveyed into it by the puncta and lachrymal ducts, if they do not find a free passage into the nose, they must necessarily be either discharged by the opening newly formed, or, if this is allowed to heal, they will again collect and produce a tumor similar to the first.

In this situation, therefore, our views must be,—To discharge the contents of the swelling,—To procure a free exit in future for the tears from the lachrymal sac into the nose,—And to prevent the duct from being again obliterated. And this being accomplished, the external opening must be healed.

While the tumor continues firm, it ought not to be opened, as this would not only excite more pain, but the parts beneath could not be so freely examined as they otherwise might be. As long, therefore, as the tumor is hard, a warm emollient poultice should be kept applied to it; and as soon as it becomes soft and compressible, it may be opened with freedom. On account of the contiguity of the eye, and of the insertion of the orbicularis muscle, to make an incision into the lachrymal sac has in general been considered as a nice and hazardous operation, and particular directions have been given, not only for the figure and size of the incision, but for discovering the exact site of the sac.

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There is no cause, however, for anxiety upon this point ; for the situation of the sac is always ascertained with precision by the tumor itself ; which is formed, as I have already observed, by tears and mucus collected in the sac ; so that any incision that discharges this collection must for certain reach the sac. Neither does the form of the opening make much difference in the hazard attending the operation. A semilunar cut has commonly been recommended ; not only with a view to render the opening larger, but in order, as it is said, to avoid with certainty the tendon of the obicularis muscle. There is no risk, however, of this tendon being injured if the incision is made where it ought to be, namely, in the most prominent and most depending part of the tumor ; and it is easier done with a common lancet than with any other instrument. The point of the lancet should be entered at the upper part of the tumor, pushed freely into the sac, and carried downwards in a straight direction to the most depending part of it. A

few fibres of the orbicularis muscle which are inserted into and spread over the chrymal sac, will indeed be divided by the incision; but no inconvenience is found to result from this; and a straight cut, such as I have directed, admits of a very free examination of the parts beneath, at the same time that it serves to evacuate more effectually than any other the tears and mucus which the tumor is found to contain.

An opening being thus formed, the contents of the tumor should be forced out with moderate pressure; a small dossil of soft lint spread with emollient ointment should be inserted between the lips of the sore, and a slip of moderately adhesive plaster employed to retain it. As a plentiful discharge commonly takes place, it is necessary to renew the dressings daily; and with a view to preserve the opening of a size sufficient for admitting of a free examination of the parts beneath, instead of a dossil of lint, a small piece of prepared sponge may be inserted into the sore eye

secor

second or third day ; but as the swelling of the sponge, by the moisture applied to it, tends to irritate and inflame the contiguous parts, it should previously be covered with a single ply of oiled soft linen, which does not hinder it to swell, at the same time that it allows it to be more easily withdrawn ; for the purpose, however, of removing it more readily, a piece of strong waxed thread should be attached to it.

In former times it was the common practice, after opening the tumor, to endeavour to destroy the hard edges of the fore, either with the actual or potential cautery, or with ointments impregnated with red precipitate, and other escharotics. By this the patient was made to suffer much unnecessary pain, and more deformity was produced ; while the chance of a cure was much less than when milder dressings are employed. Indeed the only way in which a cure can be effected with this treatment, is the total obliteration of the lachrymal sac and ducts with which it

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is

connected. These being either destroyed, or made to inflame, their internal surfaces might in some instances adhere together, on pressure being applied to them; this, however, could not frequently happen; for while the puncta lachrymalia are open, and they remained open, they would admit access to the part, and necessarily produce freedom from the disease; and when, by the violence of the inflammation, the ducts happened to be obliterated, still the patient would be liable to a constant trickling of the tears over the cheek. This idea, therefore, ought never to be kept in view. Instead of escharotics, the mildest dressings only should be employed; nor should the dossils of lint or sponge that have advised, be of such magnitude as to produce much pain; all that they are expected to perform, being to dilate the lachrymal sac, by which we may be enabled to search with freedom for the commencement of the duct leading from the sac to the nose.

In this manner any hardness in the edges of the cut will soon be removed ; and the sore being sufficiently cleared of a tough viscid kind of mucus, somewhat resembling sloughs, with which, for a few days after the operation, it is always covered, we are now to proceed to the most important part of the cure, the searching for and forming a free passage for the tears from the lachrymal sac to the nose.

This part of the operation is effected in different ways : By clearing the natural duct leading from the lachrymal sac through the groove in the os unguis into the nose ; or when this is found to be impracticable, we form an artificial opening into the nose directly through the substance of this bone from the under and back part of the lachrymal sac.

As unnecessary violence should always be avoided, we should first endeavour, by the easiest method, to discover the natural conduit of the tears, and to remove the obstruction formed in it. For this purpose, a firm round-pointed probe, or the curved

S 4 instrument,

instrument, Plate XXV. fig. 2. should be inserted, by the incision, into the bottom of the lachrymal sac; and if the point of it can be passed into the commencement of the nasal duct, some hope may be entertained of the passage being made pervious. Some degree of force may indeed be necessary for effecting this; but whenever it can be done, which frequently is the case by the probe being pushed in a proper direction with moderate pressure, it ought always to be preferred to every other method of treatment.

The passing of the probe into the nose is the most difficult as well as the most uncertain part of this operation; for when this is accomplished, we have it generally in our power to preserve the opening, by keeping a piece of bougie, catgut, or lead wire constantly in it, till the passage of the duct is rendered sufficiently clear. But sometimes happens, that all our trials for the discovery of the nasal duct prove ineffectual. Much force, however, should never be employed; for, as the point of the instrument

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instrument will more readily be pushed against the bone than into the duct, it would be more apt to do harm than good. When it enters the superior part of the canal with ease, it may with safety, and with some probability of success, be pushed forward in the manner I have mentioned; but when the duct is obliterated through its whole course, by the sides of it adhering together, an occurrence, however, which I now believe to be less frequent than I once supposed it to be, it would be highly improper, for the reason I have given, to use much force in our endeavours to detect it.

When, therefore, all our trials for discovering the natural passage between the lachrymal sac and the nose prove unsuccessful, as we know that a cure will not be obtained if the tears be not conveyed to the nose, our views must now be solely directed to the formation of an easy and free artificial opening for this purpose.

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In the anatomical description that I premised of these parts, we have seen that the posterior part of the lachrymal sac is lodged in and attached to a groove in the os unguis; and as the sac is separated from the cavity of the corresponding nostril by this bone only, it is evident that an opening made from the back part of the sac must serve to convey the contents of it into the nose. It is this part of the operation that we are now to consider.

I have already observed, that the actual cautery was formerly employed for destroying the hard edges of the sore, and as it was a prevailing opinion with almost all the practitioners of the last and preceding centuries, that the fistula lachrymalis was almost always connected with a carious state of the corresponding bones, the cautery was likewise used for assisting in the exfoliation of the diseased parts. In consequence of this, a cure was sometimes accomplished by a remedy that was employed only for the removal of what they considered as an accidental occurrence, and

not as a cause of the disease: For the os unguis being extremely thin, a hot iron can scarcely be applied to it without destroying it entirely; and as this would in some instances happen, a cure would be sometimes obtained even where the practitioners who employed the remedy were totally ignorant of the manner in which it acted; for as they were unacquainted with the real cause of the disease, from their ignorance of the anatomy of the parts concerned in it, any cures that they performed must have been more the effect of accident than of design.

It is not, however, without surprise, that we find, even in later times, when the cause of the disease is well known, and when the principles of the operation are founded on an exact knowledge of the diseased parts, that the same method of treatment has been continued. Till of late, the actual cautery was very commonly employed by the best surgeons of this country, for perforating the os unguis. Even the celebrated Cheselden patronised this method; and
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it is still practised in several parts of the Continent.

With all the caution, however, that can be employed, of covering the hot iron with a canula, or wet clothes, it is an uncertain and dangerous practice; for parts must be destroyed by it, or at least much injured, which ought not to be hurt, as it is impossible to convey a red-hot iron to the os unguis, and to destroy part of this bone, which alone ought to be perforated, without doing mischief to the contiguous parts.

The cautery ought therefore to be laid aside; and this the more readily, as the same intention can be accomplished with equal certainty, and with more ease and safety, in a different manner, merely by forcing a firm sharp instrument, of the form and size of the common trocar, from the back part of the sac through the os unguis. A curved instrument of this kind has commonly been employed, such as is represented in Plate XIX. fig. 5.; but the straight trocar, delineated in the same

Plate, fig. 2. answers better. With this instrument, the opening through the bone may be made, either by twirling it round between the fingers ; by moving it forward and backwards with the fingers or palm of the hand ; or by pushing it straight forward ; and the surrounding parts may be protected, at the same time that the instrument is more steadily fixed than it otherwise can be, by passing it through a canula, such as is delineated in the same Plate, fig. 4.

In proceeding to this part of the operation, the patient's head should be supported by an assistant ; and the surgeon, sitting or standing between him and the window, should introduce the canula of the trocar into the opening made in the tumor ; and the end of it being carried to the under and back part of the sac, it should be kept firm in this situation with one hand, while the stilette is inserted into it with the other : The point of the stilette must now be pushed firmly but slowly forward in a proper direction into
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withdrawn. The sore should now be covered with a small pledget of lint spread with emollient ointment, and the whole may be retained with a slip of adhesive plaster; for no bandage can be kept on these parts but with much inconvenience and distress.

In this manner the operation is completed; but much attention is necessary on the part of the surgeon to preserve the opening, and to prevent it from filling up in future. With this view, the lead-probe must be continued for a considerable time, in order to render the passage as callous as possible; care being taken to withdraw it every day or two, for the purpose of clearing it and the fistula from any impurities; and at each dressing a quantity of infusion of oak-bark, a solution of alum, or any other astringent should be injected with a small syringe from the external opening into the fistula. The syringe, fig. 1. Plate XX. answers this purpose properly.

No certain period can be fixed, at which we can say the passage will be sufficiently callous, and at which the lead-probe may be withdrawn; for this will in some measure depend on the constitution of the patient, as well as on the particular state of the parts themselves. In some instances, it may possibly be done with safety in a shorter period; but I have never ventured on taking it away till the eight or ninth week has elapsed, commonly not so soon. The inconvenience attending it is inconsiderable; and we are to remember, that the successful issue of the operation is to depend greatly on due attention to this part of it; for if obstruction should afterwards occur, either from the opening in the bone filling up with callus, or from the softer parts adhering together, the patient will soon be in the same diseased state as before any attempt was made towards a cure.

On withdrawing the lead, the external opening should be cleared from any mucus with which it may be stuffed; and as

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At this time it will be reduced to a very small size, it will soon heal merely by laying the sides of it together, and covering it with a piece of adhesive plaster: or, when this does not succeed in a few days, touching the edges of the sore with caustic will generally complete the cure quickly. In the next stage, moderate pressure should be continued on the course of the lachrymal duct either with the finger of the patient, or by means of the lead-probe, as represented in Plate XIX. fig. 1. And this should be continued, till there is reason to think that the sac and contiguous parts have again recovered the tone of which they were deprived by the long continuance of the disease; as well as by the operation.

What I have said with respect to the propriety of continuing the lead-probe for a considerable time, and of applying pressure afterwards on the course of the sac, is equally applicable when the natural passage of the tears has been discovered, as when an artificial opening is formed in the manner

manner I have advised. Indeed more attention is necessary to this point in the one case than in the other; for we find by experience, that the disease is more apt to return when the operation is finished by the tears being carried through the nasal duct, than when an artificial opening is made for them; owing, as I imagine, to a wider and more free passage being commonly formed by this last method of conducting the operation.

Instead of a probe of lead, some practitioners employ a piece of caigut or common bougie; but neither of these answers the purpose so well. They are more difficult to introduce;—they retain the mucus of the part, and therefore are not so cleanly;—they are apt to be entangled by the newly divided bone; and they do not answer so well for rendering the passage callous as the other.

I have thus described the different steps of the operation; and the practice I have advised is such as experience has proved to be the most successful. It must indeed be

T 2 acknowledged,

acknowledged, that it does not in every instance succeed ; for cases frequently occur which render fruitless every attempt that can be made for curing them. After performing the operation in the most satisfactory manner ; when the passage for the tears has been rendered completely pervious ; and even where external pressure has afterwards been continued in the most attentive manner ; the disease is sometimes found to recur. In such instances, however, we conclude, that scrofula, or some other disease of the constitution, takes place ; by which alone, or by the contiguous bones being carious, this operation, when properly performed, can be rendered abortive. It may sometimes indeed fail by too small an opening being formed in the os unguis ; but this is the fault of the operator, and not of the operation. There is no cause for timidity on this point : For although it has been alleged that mischief may ensue from breaking this bone with the trocar, yet daily experience tends to prove the contrary ; for
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even where it has been broken with much freedom, I never knew any inconvenience arise from it.

In order to prevent the bad consequences which those not accustomed to this operation have supposed would occur from the splintering of this bone with a trocar, it has been proposed to take out a piece of it entirely with a sharp cutting instrument, such as is delineated in Plate XVIII. fig. 3.

By applying this instrument to the os unguis, in the manner that I have mentioned for the use of the trocar, a portion of the bone may be easily cut out; but there is no necessity for this precaution. The operation is more effectually done with the trocar; and as no danger is found to ensue from it, it ought to be preferred.

In the treatment of this disease, when it is unfortunately found to return even after the operation has been properly performed, if it appears to arise from a carious state of any part of the contiguous bones, a cure may yet be accomplished

T 3 by

by laying the tumor again open; by endeavouring to accomplish an exfoliation of the diseased bone; and by afterwards forming another opening in the os unguis in the manner I have directed, if the opening made by the separation of the exfoliated pieces of bone be not sufficient. But when a relapse takes place, without some obvious cause of this kind, as any opening we might form in the bone would probably be obliterated by a continuance of the same disease of the system by which the first attempt was rendered fruitless, it could answer no purpose to repeat it, were it not with a view to make trial of a different mode of operating.

A considerable time ago it was proposed by different practitioners, to obviate the uncertainty attending this operation, by introducing a small canula of gold or silver, either through the natural passage of the os unguis, or through an opening made with a trocar; and by leaving the canula, and healing the skin over it, thus to form a passage on which no disease of the constitution

stitution could have any effect. By those who consider the usual operation for the fistula lachrymalis as very uncertain, it has been proposed to employ a canula of this kind in every case; but as this operation, when properly performed, proves frequently very successful, and as patients usually consider it as a severe measure to have an extraneous body left in a wound with a view to remain, it may be proper not to advise it in any case, till on trial we have found that the other will not succeed. In every case, however, where the usual operation has failed, the method of cure by a canula ought to be tried; and when properly performed, it will very commonly succeed. Tubes for this purpose should all be of gold, as being less apt to be injured by the fluids of the part in which they are left than any other metal; and much care should be taken to have the canula well polished, and as exactly fitted as possible to the parts in which it is placed. When properly fitted, it gives little pain, even from the time of being introduced,

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at last it frequently fits with perfect
In Plates XX. XXV. and XXVI.
rent forms are delineated of these
s, but of these fig. 5. and 6. Plate
2 V. as recommended by Mr Pellier, are
the best. They are of a length that expe-
rience has shewn to answer in the most
part of adults; and their diameter should
be as large as the opening in the bone can
admit, with a view to prevent, with as much
certainty as possible, the tears and mucus
that may pass into them from stopping
them up.

The proper length of the tube is obvi-
ously a point of the first importance in this
operation. For, if too short, it will fail
by the under part of it being apt to be
plugged up with the lining membrane of
the nose, and if too long, by the end of the
tube being pressed against the septum nasi
on the opposite side of the nostril. This
last objection appears to apply to the tube
of Mr Wathen, which, in one case in
which they were tried here by my friend
Dr Wardrop and me, proved unsuccessful
chiefly

chiefly from this cause; and as Mr Pellier's tubes, which are considerably shorter than Mr Wathen's, have answered in every case in which I have known them used, I conclude that in this respect, as I believe in every other, they are preferable to those of Mr Wathen. As the directions given for the use of Mr Pellier's tubes in the next section, are sufficiently full, I shall now refer to them; and directions for those of Mr Wathen will be seen in the explanation of Plate XXVI; in which the tubes that he recommends are delineated.

In describing the progress of the disease, I had occasion to observe that the tumor in the corner of the eye, when it inflames and suppurates, proceeds at last to a state of ulceration. This circumstance, however, does not point out any difference in the method of cure; only in this case, instead of using a lancet for laying the sac more freely open, a cut should be made with a scalpel upon a director introduced at the ulcer. In every other point, the cure

cure is to be managed as I have already advised, by rendering the natural passage of the tears pervious when this is found to be practicable ; and, when this cannot be done, by making an artificial opening through the os unguis.

When, again, the os unguis and other contiguous bones are found to be carious, the sores should be preserved open till the diseased parts are all removed ; when, if a large enough opening is not formed for the passage of the tears, by the pieces of bone which have been taken away, it may now be made, and all the other steps of the operation completed in the manner I have already pointed out. In local affections of these bones, a cure may thus be in some instances accomplished ; but where the caries depends upon a venereal taint, as is not unfrequently the case, although a well conducted course of mercury may cure the general disease of the constitution, it is seldom able to prevent very extensive exfoliations of the diseased bones ; by which, the natural passage of the tears

being destroyed, and the bones through which they should be conveyed being perhaps altogether removed, they must in future pass entirely over the cheek; for in such circumstances art can afford no relief.

SEC.

SECTION XIX.

Additional Remarks on Diseases of the Eyes.

IN the preceding sections of this chapter, the diseases of the eyes were so fully treated of, that it was not my intention to say any thing further upon them : But a foreign oculist, M. Jean François Pellier, having appeared in this country, where he deservedly acquired much reputation, I judged it proper in the former editions of this work, to communicate such parts of Mr Pellier's practice as appeared to be of importance. Possessing the advantages of a liberal education, a sound judgment, and much experience, Mr Pellier has been enabled to suggest improvements in the treatment of almost every disease to which the eyes are liable ; and an uncommon degree

of steadiness, conjoined to a quick eye-sight, give him a command of himself, and a facility of operating, not; often attained. I think it proper likewise to remark, that Mr Pellier communicated to me his knowledge of the diseases of the eyes in the most candid manner; which puts it in my power to lay his observations before the Public, he having given me permission to do so.

While, by giving an early account of material improvements, I thus acquit myself of an obligation to the Public, I at the same time embrace, with much satisfaction, the opportunity which it affords of announcing the merit of an operator, who, although a stranger, and as yet not much known in this country, is perhaps one of the best oculists now in Europe.

In the first place, I shall mention what I have learned of Mr Pellier's practice; and shall then offer such remarks as occur to me upon it.

On the subject of the cataract his observations are particularly valuable. By attentive

rentive examination, he can in many instances say whether a cataract is hard, somewhat soft, or altogether fluid; and as his method of operating varies according to these circumstances, it is of importance to be able to determine *a priori* with regard to them. He can also ascertain, whether a cataract is of a large or small size; by which he is often directed in the different steps of the operation.

I know that these are circumstances which practitioners in general consider it as impossible to judge of with precision, particularly with respect to the consistence of cataracts; and I must acknowledge, that I was clearly of this opinion, till of late that I was convinced of the contrary, not by Mr Pellier's assertions alone, but by different proofs of the fact. I assisted Mr Pellier in different cases where the cataract was extracted: In all of them he previously foretold the consistence and size of the cataract with perfect confidence; and in every instance his prognosis was precise and accurate.

I am credibly informed, too, that this happened with other practitioners in whose presence he operated in different parts of this country.

He distinguishes several varieties of cataract, which in practice ought to be kept in view.

The three principal varieties that he mentions are, what he terms the true or curable cataract; the mixed or doubtful kind; and the false or incurable.

1. What he terms the curable or true cataract, is known by the pupil retaining its natural power of contracting and dilating in full perfection, while the patient is at the same time able to distinguish the light of a candle, or of any other luminous body, and even certain bright colours, such as red, green, &c.

2. The mixed or doubtful cataract, is attended with a weak feeble contraction and dilatation of the pupil, and the patient can scarcely distinguish light from darkness. Along with an opaque state of the lens, this is supposed to be attended with a disease of

of the retina, or of some other part of the eye.

3. In what he terms the false or incurable cataract, along with an opaque state of the lens, there is evidently a diseased state of the pupil, which remains immovable to whatever degree of light it may be exposed, at the same time that the patient does not distinguish between the most brilliant light and perfect darkness.

Cataracts may be either simple or compound, or they may be complicated with other affections.

1. A simple cataract is a mere opacity of the crystalline lens, all the other parts of the eye remaining perfectly sound.

2. A cataract is said to be of a compound nature, when blindness is produced by an opaque state of the body of the lens, of the liquor which surrounds it, and of the capsule.

3. The disease he considers as complex, when it is conjoined with other affections of the internal parts of the eye; the most frequent of which is amaurosis.

Cataracts

Cataracts are not unfrequently attended with a dissolution of the vitreous humour, and sometimes with an opaque state of it. This variety of the disease is for the most part produced by violent inflammation. It is easily distinguished by those accustomed to an attentive examination of the eye; and it is particularly necessary for operators to be well acquainted with it; for no operation, either extraction or depression, should be ever advised for it. The operation has never in any instance of this kind of cataract been known to succeed; and for the most part, Mr Pellier observes, it is productive of very dreadful pain, and the most violent degree of inflammation that he ever met with. In general, too, the pain and inflammation induced in this manner remain fixed and permanent, without yielding in any degree to the usual remedies.

Cataracts are sometimes accompanied with an imperforated iris; in which case, as no light can pass to the bottom of the eye, no degree of vision takes place; and

at other times they are complicated with adhesions, either to the iris, or to the capsule of the vitreous humour. Preternatural adhesions of the lens to the capsule of the vitreous humour can scarcely be distinguished by the eye; but they take place very commonly where cataracts have been originally produced by, or attended with, much inflammation; and they always render the operations of extraction and couching difficult. It is this kind of adhesion, Mr Pellier imagines, which prevents the operation of couching from succeeding so frequently as it otherwise might do; for when it takes place in any degree, the cataract, he supposes, will always rise again on the needle being removed from it.

In forming an opinion of cataracts from the real seat of the disease, different circumstances require attention.

1. It often happens, as I have already remarked, that the lens only is opaque.—This variety of the disease is most frequent, Mr Pellier observes, in adults, and especially in old age.

2. When

2. When the opacity is seated in the capsule of the lens, if the anterior part of it only is diseased, it appears to be remarkably white, and to be placed very contiguous to the iris ; while, on the contrary, if the posterior part of it only is opaque, it is commonly of a grey colour, and the opacity appears to be deep seated.

It sometimes happens, both after the operation of extraction and couching, that the course of ten or twelve days, the capsule of the lens, which at first was perfectly sound, becomes quite opaque.—This variety of the disease Mr Pellier terms the *cataracte Secondaire*.

3. When the body of the lens and its capsule are both opaque, the cataract is commonly soft or even altogether fluid. In this case, much care is required in the operation to prevent the capsule from rupturing : A degree of nicety, Mr Pellier serves, at which those not much accustomed to this branch of practice can seldom arrive, but which is very practicable with operators of experience.

4. In some instances, cataracts appear to proceed from a partial affection of the lens, small opaque spots being observed in it, while the rest of it remains sound. In this case, vision is always most perfect in an obscure light, when the pupil is most dilated.

In forming an opinion of the consistence of cataracts, three circumstances particularly require attention.

1. When a cataract is of a firm consistence, it is in almost every instance somewhat brown; it appears in general directly behind the iris; not so deep as the lens is usually placed; and the pupil dilates and contracts very slowly.

2. A fluid or soft cataract is not commonly white, but rather of a cream colour, somewhat resembling purulent matter; and for the most part in this variety of the disease, the globe of the eye appears full, and somewhat more prominent than it usually is.

3. It sometimes happens, Mr Pellier observes, that along with this fluid state of a cataract,

cataract, the capsule is much thickened. To this he gives the appellation of the **Cystic Cataract**.

The colour of a cataract is another point of importance.

1. I have just observed, that a soft or fluid cataract is for the most part of a cream colour ; but in that variety of the disease sometimes met with in children at birth, although it is always fluid, the colour is almost always a milk white. In general, however, at other periods of life, a white cataract is of a cheesy consistence.

2. When a cataract is yellow, a small portion of the lens often remains hard, the rest of it being dissolved into a thin transparent fluid, forming that variety of the disease usually termed the Hydatid Cataract.

3. Although a black cataract is not a frequent occurrence, Mr Pellier says he has met with it in different instances. The only disease for which it may be mistaken is the gutta serena ; but with due at-

tion, the one may be distinguished from the other. In the gutta serena the disease for the most part comes on suddenly, the pupil is of a deep black, it remains immoveable in every degree of light, and the patient cannot distinguish colours, or the clearest light from perfect darkness; whereas in the black cataract, the accession of blindness is commonly slow and gradual; the pupil, to a certain degree, contracts and dilates on being exposed to light. The bottom of the eye is of a dark colour, but not of such a deep black as in the gutta serena; and the patient can distinguish light and vivid colours. In short, the symptoms of this variety of the disease are exactly the same with those of the common cataract; only, instead of being white, the opacity is black.

Mr Pellier prefers the method of cure by extraction, excepting in a few cases where the pupil is uncommonly small, when he operates by depression. He always prepares his patients for the operation, by confining them to a low diet for
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five or six days ; by giving two or three doses of salts and senna ; and when plethora prevails, he takes away ten or twelve ounces of blood.

In extracting the cataract, he makes the incision of the cornea in the ordinary place, and of the usual size ; but he has some peculiarities in his method of doing it.

Instead of placing the patient with his face opposite to a clear light, he seats him with his side towards it. If he is to operate upon the left eye, he uses his right hand, and the right side of the patient is placed towards the window. He always uses his left hand in operating upon the right eye ; and in this case the patient is made to sit with his left side towards the light.

The patient being seated, with the other eye tied down with a bandage, an assistant supports his head behind, while, at the same time, he fixes the eye on which the operation is to be performed, with the speculum, fig. 5. Plate XXII. The figure re-

presents the instrument of the full size. It is made of wire; and may either be of gold, silver, or any other metal. The head being fixed by pressing it against the breast with one hand under the chin, the assistant takes the speculum in the other; and placing the round curvature of one of the ends of it upon the upper eyelid immediately behind the cartilaginous border, he must by gentle gradual pressure upon the eyeball, fix it above, while the operator with the fore and middle fingers of his left hand, when the operation is to be done upon the left eye, must fix it below, at the same time that he draws down the under eyelid. In using this speculum, the upper eyelid is forced almost entirely into the orbit behind the eyeball, but it immediately returns to its natural situation on the instrument being removed.

The eye being thus fixed, the knife, fig. 1. Plate XXII. fixed in its handle, must be put into the operator's right hand, who now divides the cornea in the usual manner: But when the point of it comes
opposite

opposite to the pupil, if the capsule of the lens is to be divided, Mr Pellier has arrived at such dexterity in this operation, that he plunges the point of the knife through the pupil into the lens; and withdrawing it gently, he carries the point of it forward to the opposite side of the eye, and finishes the operation in the usual way. But in making the latter part of the incision, he is very attentive to the pressure made by the speculum, which he desires the assistant to remove entirely before completing the incision, in order to prevent the vitreous humour from escaping.

This being done, the eyelids are immediately shut; and while they are in this state, a slow, gradual pressure is made upon the eyeball, with the flat end of the instrument, which he terms a Curette, fig. 1. Plate XXV., which for this purpose is placed immediately above the tarsus of the upper eyelid. As the access of light to the eye is thus prevented, the pupil remains in a state of dilatation, by which
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the lens is more easily pressed out than it otherwise could be; and if the pressure is cautiously applied, no part of the vitreous humour is ever forced out.

When the cataract does not come out entire, which is sometimes the case, or when it is found to adhere to the contiguous parts, the end of the curette is introduced through the pupil, and any adhesions that take place are gradually separated; at the same time that any detached pieces of the lens are turned out through the cut in the cornea: Or, instead of the curette, the cistatome, fig. 3. Plate XXIV. is sometimes employed for separating the adhesions.

In the course of this operation, it sometimes happens that the iris is forced too much forward into the anterior chamber of the eye, or even altogether through the cut in the cornea. With a view to prevent the bad effects that might result from this, Mr Pellier insinuates the flat side of the curette into the wound in the

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cornea,

cornea, and by means of it endeavours to put the iris into its natural situation.

This is the usual method, in which Mr Pellier performs this operation; but circumstances sometimes occur that require some peculiarity of management. The most material of which are these: When he has reason to think that the cataract is in a fluid state without any opacity of the capsule, instead of making an opening in the cornea of the usual size, he inserts a sharp-pointed knife, somewhat convex on the back, into the inferior part of the transparent cornea, at a small distance from the iris; and having made an incision of about the tenth part of an inch in length, he pushes the point of the instrument upwards till it comes opposite to the pupil; when he carries it cautiously on till it reaches the lens; and having now made an opening in the capsule sufficiently large for discharging the fluid contained in it, he withdraws the instrument with the same caution with which it was introduced, and in this manner the operation is finished:

finished: The cataract being in a state of fluidity, the whole of it passes easily off without any pressure.

When, again, along with a soft or fluid cataract, there is reason to suppose that any part of the capsule is opaque, or even where the capsule alone is supposed to be diseased, he carefully avoids opening it or bursting it in the course of the operation: In either of these events, he says it would be with difficulty extracted. He therefore by slow gradual pressure with the curette, in the manner I have mentioned, forces out the lens, contained, as he imagines, in its capsule or cyst; and he does it, he says, in every instance without forcing out any part of the vitreous humour. In some cases, however, he finds it necessary to introduce the end of the curette through the pupil, and to separate the capsule of the lens from the contiguous parts; but even this, he says, does no harm to any part of the eye. The importance of our being able to judge from the appearances of a cataract, of the real state of the disease,

case, is therefore sufficiently obvious, from the difference which this variety of it requires in the method of conducting the operation.

In extracting the cataract, it is a matter of the first importance to avoid the iris with the knife; but as this is extremely difficult in eyes that are not prominent, Mr Pellier often employs a knife with that side of it convex which passes next to the iris. One of these instruments is represented in Plate XXII. fig. 2. In every other respect this knife is the same with that which he uses in ordinary cases, represented in fig. 1. of the same plate.

In the course of this operation, it sometimes happens that the aqueous humour escapes in too great quantity before the point of the knife is carried across the eye so as to penetrate the opposite side of the cornea: When this takes place, which it often does when the hand of the operator is not perfectly steady, as the iris is apt to pass in before the point of the instrument, Mr Pellier advises the sharp-point-

ed knife to be withdrawn, and another with a probe point, fig. 3. to be introduced at the opening; and the point being slowly carried over to the opposite side of the eye, an incision is there to be made, either with the other sharp-pointed knife or with a common lancet, sufficiently large for letting out the blunt point of the other; when the operation is to be finished, by pushing it forward, and making a semicircular incision in the usual way in the under part of the cornea.

As soon as the cataract is extracted, it is the common practice to present a watch or some other object to the patient, with a view to discover the success of the operation. In some instances Mr Pellier has been forced to consent to this; but he does not approve of it. Instead of this, he immediately closes the eyelids, and covers each eye with a small bag of soft old linen or cotton about half filled with soft fine wool. These bags are applied dry, and are fixed with pins to a circular bandage of old linen passed round the forehead,

head, which again is kept firm in its situation by a slip of the same linen made to pass beneath the chin and over the upper part of the head ; care being taken to fix them both with pins to the night-cap below.

The patient is now to be undressed, and with as little exertion as possible should be laid in bed, upon his back, with his head low : In this situation he is desired to remain with as little variation as possible during the first six or eight days, as it tends more than any other in which he can be placed to a speedy cure of the wound in the cornea. If the patient is not low and emaciated, Mr Pellier always advises eight or ten ounces of blood to be taken in the course of a few hours after the operation. He keeps him on a low diet, and gives small doses of opiates from time to time, which answer better than a large dose at once, which often excites sickness and vomiting, symptoms that ought to be guarded against ; for nothing so readily hurts the eye after this operation

tion as the exertion of vomiting, coughing, and sneezing. For which reason he does not admit of snuff or tobacco in any form being used for the first eight or ten days.

An easy stool is procured daily, and on the fourth or fifth day the dressings are removed; when after clearing the eye of any mucus or matter that has formed on it, and the eyelid being cautiously lifted, the same kind of bandage is applied again. From this time forward, the dressing is renewed every second day, and in ten or twelve days from the operation, the eye should be bathed before the new bandage is applied, with a weak saturnine solution; but till this period, warm milk and water is considered as preferable. About the end of the third week, the bags of wool, after having been gradually lessened, are taken away, and a piece of green silk put over the eyes instead of them. If no unusual interruption occurs to the cure, the diet is now made gradually better; and when the operation has been performed

ed on one eye only, Mr Pellier commonly allows the patient to go abroad at the end of the fourth week, but never sooner ; and even then the eyes are kept well covered : But when both eyes have been cut, he advises a confinement of at least six weeks.

This is the plan of treatment which Mr Pellier pursues in ordinary cases ; and he attributes much of the success of his operations to a rigid observation of these regulations. But where there is a particular tendency in the system to inflammation, remedies of a different kind are necessary.

The eye becomes in some cases so much inflamed even in the course of a few hours from the operation, that one bloodletting is not sufficient. In this case he advises leeches to be applied to the temple and contiguous parts ; and if a second or third general evacuation is necessary, he directs the blood to be taken from the foot, as by experience he finds this to answer better than taking it from the arm or neck. The patient is desired to drink plentifully

fully of Arabic emulsion, with a large proportion of nitre. The pediluvium frequently repeated, he finds proves useful. And, for the removal of that violent pain which inflammation supervening to this operation commonly excites, nothing that has yet been tried, he thinks, answers so well as a liniment composed of the white of an egg and powdered alum beat for a considerable time together: A little of which should be applied to the eye every two hours between two plies of soft old linen. Besides affording relief from pain, it tends more effectually than any other remedy to stop the progress of inflammation; inasmuch, that Mr Pellier employs it in every case as soon as the eye begins to inflame.

Instead of alum, he sometimes adds to the white of an egg three grains of white vitriol, and the same quantity of saccharum saturni dissolved in a spoonful of rose water; and the whole being well beat together till it puts on the appearance of white froth, a little of this is inserted
between

between the eyelids with a small pencil three or four times a-day, at the same time that the eyelids are covered with a small bag of thin linen in which some of it is contained. When the heat and pain attending the inflammation begin to abate, he advises a poultice composed of a ripe apple, well boiled, with the water pressed out of it, to which he adds a small quantity of camphor and powdered saffron.

By persevering duly in these means the inflammation is commonly at last removed. In some instances, however, this does not happen, and notwithstanding the utmost attention, all the symptoms become worse; the vessels of the tunica conjunctiva become turgid; the eyelids swell to a considerable size; and the pain, which before was severe, becomes insupportable. In this situation, nothing tends to stop the inflammation but local bloodletting carried to a considerable extent by incisions made in the affected parts. For this purpose the mere division of the turgid vessels with a lancet or small scalpel sometimes

nial escharotic; an attempt, Mr Pellier observes, that may be made with safety, if care be taken to prevent the caustic from hurting the rest of the eye, by touching the diseased part only, and immersing the eye immediately in warm milk, or in some warm emollient decoction. But when the disease is farther advanced, and the tumor firm and solid, it answers better to remove it entirely either with the scalpel or scissors; or if it appears to be any part of the aqueous humour contained in a thin membranous production, as is sometimes the case, all that is necessary is, to make an opening into it with a lancet of a size sufficient to discharge what it contains. It is scarcely necessary to observe, that after either of these operations, the parts must be treated with much attention, otherwise much harm would arise from it. A strict antiphlogistic regimen must be observed. The eye should be lightly covered, either with a small bag, such as I have mentioned above, filled with soft wool, or with a compress of
old

old linen soaked in a weak solution of saccharum saturni.

Mr Pellier's method of extracting the cataract, which I have thus endeavoured to describe, with his treatment of the consequences that sometimes ensue from it, is the result of much experience, and usually answers better than any other with which we are acquainted. Much of Mr Pellier's success undoubtedly proceeds from his superior dexterity in performing the operation; but much of it also depends upon the minute attention that he gives to every case for a considerable time after the operation. In ordinary practice, and especially with the most part of itinerants, it is commonly supposed, if the operation is properly performed, and if the cataract comes away easily, that little more is required of the operator; but it is much otherwise with Mr Pellier, who considers the after treatment as so essential, that he commonly declines to operate where he cannot have the subsequent management of the case for two or three weeks: And

by constant and assiduous attention, he is often able to obviate symptoms that would otherwise prove alarming; and which often might render operations altogether abortive, which might otherwise be attended with complete success. This I had various opportunities of observing.

In the preceding section, I entered into a full discussion of the respective merits of the two operations of couching and extracting the cataract; and I then endeavoured to establish the preference of the former: But if experience shall shew, that Mr Pellier's method of operating is attended with more permanent advantages, I shall be very ready to retract my opinion; for which purpose, I shall carefully attend to the consequences of those operations that he has performed in this country; and as the public will probably be interested in them, I shall at some future period perhaps communicate the event of them.

There are two points of importance in this operation, with respect to which I differ

differ in opinion from Mr Pellier. When he considers it as proper to divide the capsule of the lens, he frequently does it, as I have already observed, by insinuating through the pupil the point of the same knife with which he makes the cut in the cornea; even before the incision is completed.

This may possibly be done with safety by such a very dexterous operator as Mr Pellier: But as most practitioners, by imitating him, would run the risk of hurting the iris, the practice should not be encouraged; for when the capsule of the lens is to be divided, it is surely better to do it after the incision of the cornea is finished, by lifting up the flap, and passing in the end of the blunt probe represented in Plate XVIII. fig. 5. or of the cistatome, Plate XXIV. fig. 3.

The other point to which I allude, respects the practicability of extracting the capsule of the lens, without doing any material injury to the eye.

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When the cataract appears to be of a firm consistence, and when the disease is supposed to be confined entirely to the lens itself, Mr. Pellicier frequently opens the capsule in the manner I have just described, with a view to allow of a more easy extraction of the lens; and in this case he admits that the capsule remains in the eye: But when he finds, after an operation, that the capsule of the lens becomes opaque, or if he observes that any part of it has been previously in a state of opacity, he advises it to be cautiously extracted with small forceps: And again, in every case where he suspects the cataract to be fluid, forming what he calls the Cystic or Hydatid Cataract, he avoids the division of the capsule, and advises the lens to be taken out included in it; which he says may be done in the manner I have mentioned, by making an equal and gradual pressure upon the ball of the eye immediately after the division of the cornea; or by separating any adhesions that take place between the capsule of the lens and the contiguous parts,

parts, with the curette, Plate XXV. fig. 1. passed through the pupil.

I have not indeed seen Mr Pellier extract the capsule of the lens, after removing the lens itself; for no cases requiring it occurred during his residence here: I received, however, full information of his method of doing it, by introducing small forceps at the pupil. But as I cannot imagine how this can be done without injuring the eye materially, I must still retain the opinion I advanced of it in a preceding section, till I have evident proofs of its being practised with advantage. And whenever these are offered, I shall receive them with much satisfaction, as it would in many instances be a material improvement of this operation.

We have now to consider the possibility of extracting the capsule entire along with the lens: Several practitioners in this country had opportunities of seeing Mr Pellier extract cataracts, as they supposed, in this situation. I saw him operate in two instances of this kind, where he, as well

well as several others, imagined that the real capsule was taken out along with the lens ; but as I entertain a different opinion on this point, it is proper to state the reasons which have led to it.

1. The capsule of the vitreous humour, and that which contains the lens, are so intimately connected together, that it is difficult, or perhaps impossible, for the best anatomist to determine whether they are separate productions or not : At least they are so intimately connected, that they appear to be formed of the same substance, the crystalline lens being surrounded with a coat which seems to be a thin lamella of that which forms the capsule of the vitreous humour. The contrary, I know, has been alleged ; but whoever will make the experiment, will find that the capsule of the lens has exactly the appearance that I have mentioned. It appears to be a production of the other ; and they cannot be separated without tearing or destroying some part of one or both of them : Now, if this is the case when the contents of the
eye

eye are all laid open, and when all the assistance can be got that nice dissection affords, it appears to me impossible that they should be separated in the operation of extracting the cataract, without injuring the rest of the eye, and particularly the vitreous humour, very materially.

1. In performing this part of the operation, viz. in attempting to extract the capsule of the lens entire, Mr Pellier does it by means which do not appear adequate to the intended effect. He does it in most instances, by making a gradual equal pressure over the ball of the eye, and not by the introduction of forceps. Now, it is difficult to conceive in what manner pressure applied to the eye can separate that intimate connection which certainly takes place between the capsule of the vitreous humour and that of the crystalline lens: By pressure they are frequently both forced out; but no operator would wish to meet with this, and no person guards with more anxiety against it than Mr Pellier, in so much, that the escape of the vitreous humour,

humour, or even of any part of it, is an occurrence he rarely meets it. In some cases, indeed, Mr Pellier insinuates his curette, as I have already remarked, through the pupil, with a view to detach the capsule of the lens from the contiguous parts: He allows, however, that this is not always necessary; and besides, there is much cause to suspect, that the eye would often be hurt by it.

3. When it is found, however, as I have already observed, either during the operation or afterwards, that the capsule of the lens is opaque, even Mr Pellier himself does not attempt to extract it by pressure. In this case he does it with forceps passed through the pupil. Now, if pressure answers in one variety of the disease, it ought probably to do so in others, so that the use of forceps should not be necessary; but it is only in the hydatid or soft cataract which Mr Pellier allows that this practice by pressure succeeds.

4. But as several practitioners, both here and elsewhere, have seen Mr Pellier extract the cataract, surrounded, as they imagined, with its proper capsule; and as he asserts with confidence, that it may be done merely by pressure; it will be asked, In what manner is this apparent contradiction to be explained? I can account for it only on the supposition of there being in all such cases, where this practice of extracting the capsule entire is considered as admissible, a preternatural formation of a new membrane within the capsule of the lens; which being of a firmer nature than the capsule itself, and probably very little, if at all, attached to the contiguous parts, we can easily see how it may be forced out entire, even by moderate pressure, and how easily bystanders may be deceived with it. When I first saw it done by Mr Pellier, as he previously said that he would extract the whole capsule along with the lens; as I had heard from very respectable authority that he had done it in different instances in Glasgow; and as I certainly
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saw the crystalline pushed out, surrounded with a membranous bag, I must own that I was nearly converted to Mr Pellier's opinion: But on further consideration, the reasons I have mentioned against it appeared too conclusive, even for this weight of evidence, to remove; and since that period, a circumstance has occurred, which with me puts the matter beyond a doubt. A cataract of a soft nature was extracted by Mr Pellier, surrounded with this membrane or bag quite entire. From the first I doubted much of its being the proper capsule of the lens, as it was said to be; for this tunic is well known to be exceedingly fine and delicate; whereas this membrane was firm, and required some degree of force to tear it. The patient, however, distinguished objects immediately after the operation; and what was then advanced concerning it could not be well refuted: But by some cause or other, possibly from the eye becoming inflamed, an opacity soon began to form in the old site of the crystalline, directly behind the pupil,

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forming to all appearance a real cataract ; and it now continues, even after the inflammation is removed. Whatever explanation may be given of this by those who are inclined to support the contrary opinion, it proves to me a convincing proof that some deception takes place where the capsule is supposed to be extracted entire along with the lens ; for in this case, where the capsule was imagined to be taken entirely out, the opacity which succeeded, and which still exists, appears evidently to be seated in the capsule, and nowhere else. I therefore conclude, where practitioners have imagined the capsule was extracted entire, that they have been deceived by the lens being enveloped with a preternatural bag or cyst, formed perhaps by an inflammatory exudation from the internal surface of the capsule : That this production, however, is certainly formed in this manner, I will not positively assert ; but in my opinion it is the most probable way by which we can account for it.

These are the remarks that I have to offer on Mr Pellier's theory and practice in the treatment of cataract. If further observation shall convince me that I am wrong, I will readily acknowledge my mistake; but, in the mean time, the reasons I have adduced, appear to evince the impropriety of extracting the capsule piecemeal, by means of forceps passed through the pupil, as well as the impossibility of making it pass entire along with the lens.

It sometimes happens in smallpox, as well as in severe inflammation of the eye from whatever cause it may proceed, that the centre of the cornea is left in a state of opacity, by matter forming between the coats of it. When not carried off by the remedies usually employed, if the iris, retina, and other parts of the eye appear to be sound, Mr Pellier advises an operation, from which he has in different instances derived much advantage. The centre of the cornea being opaque, the rays of light are thus prevented from passing to the bottom of the eye through the pupil;

pupil; but when the sides or external border of the transparent cornea still remain clear and sound, light may be allowed to pass to the retina, by enlarging the pupil; which, Mr Pellier says, may be done with safety by making an incision from one side of the iris to the other. And his method of doing it is this: He first makes an opening in the prominent part of the cornea, in the same manner as for extracting the cataract: He then inserts a small grooved director beneath the flap of the cornea through the pupil; and having passed it in a horizontal direction, immediately behind the iris, towards the outer angle of the eye, he now takes a pair of small curved scissors, and passing one of their blades along the groove of the director, he at once divides this part of the iris, when he withdraws the instruments, and makes a similar cut on the opposite side of the eye. In this manner, when the opacity is confined to the centre of the cornea, which it often is, the rays of light which pass through the sides of it get access to the

bottom of the eye, by the pupil being extended from one side of the iris to the other; and thus a degree of vision is produced which could not otherwise be obtained. It will readily be imagined, that perfect vision is not to be obtained in this state of the eye: various reasons indeed concur against it: But it is a matter of importance for a person already totally blind to be rendered capable of finding his way, and of conducting himself from one place to another, which, by this operation, Mr Pellier has done in different instances: And, so far as I know, the public are indebted to him alone for proposing it.

After the operation, the eye must be tied up, and treated in the same manner and with the same attention as is done after extracting the cataract; for where so much violence is done to the eye, if inflammation be not guarded against, much mischief may ensue from it.

In describing the method of dividing the iris, I have said that it should be done with scissars; for this membrane being
loose

loose and unsupported, it would yield before the edge of the sharpest knife. In the introduction of the director and scissors, care should be taken, in passing them between the iris and lens, not to injure either the lens or its capsule ; that is, when the disease is not complicated with cataract ; for when the crystalline is opaque, it should be extracted.

In the treatment of the fistula lachrymalis, Mr Pellier has much merit ; for, with most operators, it often happens that no permanent advantage is obtained from any of the remedies that they employ, and even those who prove most successful very frequently fail. Mr Pellier does not say that he always succeeds ; but he does so in most instances ; and I know that his method has often proved successful where others have failed.

In a confirmed fistula lachrymalis, the curative intention is, to form an opening between the lachrymal sac and the corresponding nostril. In Section XVIII. of this chapter, I have shewn that this is ac-

complished in different methods; by searching with a blunt probe, to discover the natural passage: if this fails, by making an artificial opening through the *os unguis*; and when neither of these succeed, by leaving a tube or canula, either in the natural or artificial opening, for the purpose of conducting the tears to the nose.

As we know from experience, that the operation fails frequently from the passage becoming again impervious, and this whether it may have been done by opening the natural passage or by forming another, it would be the idea perhaps of most practitioners to leave a tube in the opening, were it not liable to one very important objection, namely, the uncertainty of its continuing fixed in its situation; for hitherto we have not been possessed of any certain method of preventing the canula either from rising and forcing its way out at the corner of the eye, or from passing down and coming out at the nose. In Plate XX. I have delineated various forms of tubes that have been used for this purpose;

pose; and of these, figures 3. and 10. will frequently be found to answer: For when pressed sufficiently into the opening through the os unguis, the bulge or prominence with which they are furnished above, for the most part prevents them from rising, while their conical shape prevents them from passing into the nose. I must, however, acknowledge, that they sometimes fail; and that an invention of Mr Pellier's answers better. Mr Pellier asserts, that when properly introduced, it never fails; and from any experience that I have had of it, I am clearly of the same opinion. In a patient of mine, on whom the operation was performed upwards of fifteen years ago, and in others where it was done nine or ten years ago, the tubes are still firm and immovable, and answer the purpose of giving a free passage to the tears. Two representations of these tubes are given in Plate XXV. figures 5. and 6. They may be made either of gold or lead. Mr Pellier commonly employs lead: But when of gold, the tube is less bulky; and

as this metal receives a finer polish, by which the opening through it is not so readily filled up with the tears, it ought, I think, to be preferred.

. The peculiarity of form of Mr Pellier's tubes consists in their having two projecting edges ; one at the top forming a kind of brim, corresponding as nearly as possible to the size of the lachrymal sac ; and the other near to the middle between this and the other end of the instrument ; by which means, when properly fixed in the passage where it is to remain, it is kept firm in its situation by the granulations that shoot out from the contiguous parts ; and which, by grasping as it were that part of the tube which lies between the two projecting edges, effectually prevent it from passing either up or down ; and hence that material inconvenience is avoided, of which practitioners, who employ cylindrical tubes, always complain.

It is necessary, however, to observe, that the utmost nicety is required in the use of these as well as of every variety of

tube; not merely in accurately adapting them to the size of the openings through which they are to pass; but afterwards in ascertaining the depth to which they should be pressed into the nose: For if a tube be either too small or too large for the opening through the os unguis, we may readily imagine that it will not answer; and if it is pressed even in a trifling degree too far into the nostril, it will necessarily irritate the lining membrane of that cavity, so as to create much pain and inconvenience. The tubes represented in Plate XXV. are of a size both in length and thickness that answers for the most part of adults, but practitioners should be provided with various sizes.

The method of using them is this. After laying the lachrymal sac freely open in the usual way, the natural conduit of the tears is searched for, either with a firm probe, or with the conductor, Plate XXV. fig. 2.; and Mr Pellier asserts, that he never fails in finding it. As soon as this is discovered, the tube must be put
upon

upon the conductor, previously furnished with the compressor, fig. 3. as in fig. 4; and the tube should be of such a size that the conductor may fit it exactly in point of thickness, while the end of this part of the instrument is so much longer as to pass through the tube about the tenth part of an inch. The point of the conductor is now to be insinuated into the lachrymal duct; and being pushed in till it reaches the nostril, which may be known either by passing a probe up the nostril, or by a few drops of blood being observed to fall from the nose, the conductor being no longer necessary, must be withdrawn, taking care to leave the compressor upon the upper brim or edge of the canula; which must be firmly pressed down with it in the left hand, while the conductor is removed with the other. If this precaution be not taken, the canula would be brought out along with the conductor; but this inconvenience is thus very effectually guarded against, while the same instrument serves more easily than any other to press the canula

into a sufficient depth in the lachrymal duct; a point of the first importance in this operation; for if the canula be not firmly fixed at the first attempt, it will not afterwards be so easily done.

This being accomplished, the compressor must be taken out; and, with a view to discover whether the canula is at a proper depth or not, a little milk and water should be injected through it with the syringe, Plate XX. fig. 1. If the injection passes easily into the nostril, there will be no reason to doubt of the canula being properly placed; but, if any obstruction occurs, there will be reason to fear that it is already pushed too far, and that it presses against the os spongiosum inferius; in which case the canula should be withdrawn, with a view to shorten it, when it must be again introduced in the manner I have mentioned.

As the wound recently made in the sac will yield a large quantity of matter, it ought to be kept open for eight or ten days with a bit of soft lint spread with any emollient

emollient ointment, taking care to cover the whole with a compress of soft old linen, secured with a proper bandage. An injection of milk and water should be daily passed through the canula; and at the end of this time, or whenever the suppuration is much diminished, and the sore looking clean and in a healing state, the dossil of lint should be removed; and a piece of court-plaster being laid over the sore, it may in this state be left to heal, care being taken to renew the plaster occasionally, if any matter appears to form beneath it.

By this mode of treatment, cases of *stula lachrymalis* that do not depend on disease of the contiguous bones, or on any latent disease of the constitution, will for the most part, as Mr Pellier observes, be completely cured in three weeks, nay sometimes in a fortnight, which by the usual practice might require three, four, or five months.

In Plate XXVI. I have delineated the form of tube, as well as all the other parts of the apparatus employed for this operation,

tion, by Mr Wathen ; but although the invention is ingenious, and may answer in a great proportion of cases, as Mr Pellier's tubes appear to me to be better adapted to the form of the lachrymal passages, while his mode of introducing them is more simple, I think it probable that they will meet with a preference.

As I have been witness of the most complete success of Mr Pellier's practice in this disease, I have considered it as a point of justice, not only to Mr Pellier, but to the Public, to give this full detail of it. If I had not indeed been convinced of the superior utility of Mr Pellier's practice, and of the unreserved manner in which he communicated his knowledge of the diseases of the eyes, I should have deemed it impertinent to have given the preceding account of either to the Public.

Since the first edition of this was published, the opinion which I then suggested, of the impossibility of extracting the capsule

capsule of the lens entire, has been a subject of much investigation: And as now appears that it cannot be done, I shall conclude that Mr Pellier, and others who supported a different opinion, have been deceived.

CHAPTER XII.

Of the Diseases of the NOSE and FAUCES.

SECTION I.

*Anatomical Description of the NOSE and
FAUCES.*

A MINUTE description of these parts is not necessary for our purpose; but a few remarks on their general form and structure will serve to elucidate the nature of the diseases to which they are liable.

The

The external prominent part of the nose is chiefly composed of bones and cartilages, which serve to protect the more deep-seated parts of the organ of smell, and to form a kind of vaulted passage for the air to the throat.

This passage, divided by the septum nasi, forms the nostrils, which extend almost in a horizontal direction from the superior part of the upper lip backwards to the pharynx, where they terminate above the velum pendulum palati.

The superior and lateral parts of the arch of the nose, are formed by the nasal process of the os frontis,—by the two ossa nasi,—by the ossa unguis,—and by an extensive process from each of the ossa maxillaria, to which the cartilaginous alæ of the nose, covered by the common teguments, are immediately attached.

The septum narium is formed by the nasal process of the ethmoid bone,—the vomer,—middle cartilage of the nose,—and spinous processes of the palate and maxillary bones.

The

The under part of the cavity of the nose is anteriorly bounded by a horizontal process of the ossa maxillaria, and backwards by a process of a similar form, from each of the ossa palati. The sphenoid and ethmoid bones form the boundaries of the posterior part of the nares.

Towards the upper part of the nose we meet with a very beautiful contrivance of nature for enlarging the organ of smell. In the superior part of each nostril, opposite to the septum, we find a spongy, cellular production of bone, proceeding from the os ethmoides, which, from their form, texture, and situation, are termed *Conchæ*, *Ossa Spongiosa*, or *Ossa Turbinata Superiora*: And beneath these, on the same side of the nostrils, are two bodies of a similar texture, which have likewise been supposed to be productions of the ethmoid bone, but of which there is no evidence; which, from their situation, are termed *Ossa Spongiosa Inferiora*. In some instances, two, and even three, small bones of this kind are

met with in each nostril ; but this is not a frequent occurrence.

These bodies being prominent and irregular on their surfaces, give the nostrils a winding, or even a crooked appearance : But every practitioner will know, that they are so in appearance only ; inasmuch that a probe may be passed almost in a straight line from the external nares to the throat.

We meet with several openings which terminate in the nostrils, with some of which it is material for surgeons to be acquainted, namely, the ductus incisorii, which commence at the under and back part of the nostrils, and terminate behind the dentes incisivi of the upper jaw ;—the sinuses of the sphenoid and frontal bones, which both open into the upper part of the nares ;—the sinus of each maxillary bone, commonly termed the Antrum Maxillare, or Highmorianum, which opens into the nose between the upper and under ossa spongiosa of the same side ;—and lastly, the ducts of the lachrymal sacs, which

in the preceding Chapter I have had occasion to describe, and which terminate on each side immediately beneath the *os spongiosum inferius*.

All the cavity of the nostrils; the different sinuses I have mentioned, as well as the passages which lead to them; the whole surfaces of the *ossa spongiosa*, and even the *fauces*, are covered or lined with a thick soft membrane, which, from its affording a plentiful secretion of mucus, is commonly termed *Membrana Pituitaria*, or *Membrana Schneideri*, from Schneider, the first anatomist who gave an accurate account of it.

This membrane appears to be a continuation of the cuticle. Towards the external nares, near to its connection with the epidermis, it is exceedingly thin; but as it proceeds backward upon the *septum nasi* and *ossa spongiosa*, it acquires a considerable degree of thickness; and again becomes thin as it proceeds to line the different sinuses.

The cavity of the nose, as I have already remarked, is separated from the mouth by a plate of bone, formed by a process from each of the ossa maxillaria, and by the ossa palati. To the posterior edge of the last mentioned bone there is a firm membrane connected, termed the Velum or Valvula Palati, formed by a junction of the common membrane of the mouth, with a continuation of the Membrana Schneideri, together with several muscular fasciculi, intended for the motion of this and the contiguous parts. This membrane, as it stretches back from the palate, falls down and terminates in the uvula immediately above the root of the tongue; by which it is not only well fitted for preventing the food, during mastication and deglutition, from passing up to the nose, but for conveying back to the pharynx all such parts of the mucus furnished by the membrane of the nose, and contiguous sinuses, as are not discharged by the external nares.

On each side of the throat, at the termination of the velum pendulum palati, there

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is situated a prominent glandular substance, commonly termed the *Amygdalæ* or *Almonds of the Ear*. They are naturally of a soft, yielding texture ; and in general they have excavations of different degrees of deepness on various parts of them, which, by those not acquainted with the usual appearances of these parts, are often mistaken for ulcerations. On looking farther into the throat, along the course of the tongue, a thin, elastic, cartilaginous body is observed, termed *Epiglottis*, which is so placed as to prevent the food from falling into the trachea in its passage from the mouth to the pharynx, a wide capacious bag, which terminates in the *œsophagus*, and occupies all that part of the throat that is seen on looking into the mouth.

From this description it is evident, that the pharynx is furnished with several openings or outlets. Below, it terminates in the *œsophagus* ;—anteriorly, it communicates directly with the mouth ;—and from the superior part of the bag it has a free

direct communication with the posterior openings of the nostrils.

I shall now proceed to consider the diseases of these parts, and the operations that are practised for them. The subjects are, — Hemorrhagies from the Nostrils, — Ozena, — Imperforated Nostrils, — Polypous Excrescences in the Nose and Throat, — Extirpation of the Amygdalæ and Uvula, — Scarifying and Fomenting the Throat.

S E C.

SECTION II.

Of Hemorrhagies from the Nostrils.

THE internal parts of the nose are supplied almost entirely with blood from the internal maxillary artery: In general, the branches of this artery that go to the nose are so small, as to render a division or rupture of them an object of little importance; but, in some instances, it is otherwise, and hemorrhagies occasionally occur from these parts that give much anxiety and distress to practitioners, and prove very hazardous to patients. They have sometimes even baffled every attempt that could be made to restrain them; so that, however inconsiderable this evacuation may in a great proportion of instances be, it ought, in every case, to be treated with attention.

In a great proportion of cases, a proper application of cold puts a temporary stop to the discharge ; and in general, any future returns of it may be prevented by bloodletting, a moderate use of cooling laxatives, and a low regimen.

In order to obtain all the advantages that may be derived from cold, it must be employed in various ways, and to a considerable extent. The patient should be placed in a large apartment, with a current of cold air passing through it : His food and drink ought all to be cold : His face should be frequently bathed, and even immersed, in cold water, or in cold water with a proportion of vinegar : The mouth should be kept filled from time to time with a cold solution of alum, or any other astringent : Compresses, wet in any liquid of this kind, should be applied over the nose : When in bed, the patient should be lightly covered ; and he should sleep with his head as high as possible.

By these means being duly continued, nasal hemorrhagies may in general be removed ;

moved; but in some instances no benefit is derived from them, the flow of blood not being in any degree diminished by whatever care and assiduity they happen to be applied.

In such cases, compression of the ruptured bloodvessel is alone to be depended on; but when deeply seated in the nostril, the application of pressure is both difficult and uncertain. It sometimes happens that a doffel of lint passed into the bleeding nostril will put an immediate stop to the discharge. This, however, is rare; for the extent and diameter of the passage through which the doffel is pushed being very unequal, the effect produced by it must likewise be so: Hence we cannot place much dependence on this method of applying pressure.

In former editions of this work, when treating of the discharge of blood from the anus in cases of piles, I advised the application of pressure by the introduction of a piece of gut, tied at one end, into the rectum, and by filling it at the opposite extremity

tremity with any cold liquid, to increase the pressure by forcing up the liquid, and securing it with a ligature. The same remedy may be employed in hemorrhagies from the nose. It has already been successfully used in a few instances ; and may frequently, I think, be employed with advantage. A piece of hog's gut, previously dried and moistened again, answers best. One end of it firmly tied with a bit of small packthread, should, by means of a probe or director, be pushed along the whole course of the nostril from which the blood is discharged, to the upper end of the pharynx. The gut should now be filled with cold vinegar, water, or any other cold liquid, by means of a syringe inserted at the end hanging out at the nostril ; and as much being injected as the gut will admit, the whole should be pressed as far up as possible, and secured in this situation with a ligature.

In this manner a very considerable degree of pressure may be applied ; and some advantage may be derived from the application

cation of cold directly to the vessel from whence the blood is discharged. In some instances, however, even this may fail, owing to the ruptured artery being so situated that pressure cannot in this manner be directly applied to it. In such circumstances, other means must be employed, and the following very commonly answer.

Let the curved instrument, fig. 4. Plate XXX. be inserted at one of the nostrils with a piece of catgut or firm waxed thread contained in it; and being conveyed into the throat, the ligature must be laid hold of with forceps or the fingers, and taken out at the mouth; when the instrument is to be withdrawn, and again introduced at the other nostril with a ligature of the same kind, to be likewise taken out at the mouth. A bolster of soft lint, of a sufficient size for stuffing or filling the posterior nares, is now to be firmly tied to the two ends of the ligatures hanging out at the mouth, when the opposite ends of them must be pulled forward at the nostrils till the cushion of lint is firmly applied to
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and fixed in the upper part of the pharynx; when a compress of linen must be applied to each nostril, and fixed in this situation by tying the ligatures over it. The patient should now be laid to rest. If the bolsters of lint have been properly applied, no blood will escape either from the posterior or anterior nares; any blood that is effused into the nostrils will soon coagulate, and thus a stop will be put to the hemorrhagy. It is evident, however, that in order to insure success, the bolsters of lint should not only be accurately applied, but continued for a length of time sufficient for admitting of the healing or re-union of the ruptured bloodvessels.

In fixing the bolster of lint in the back part of the mouth, I have advised two ligatures to be employed; one to be passed through each nostril. In this manner it may be applied not only more firmly, but more equally, than by the usual method of passing only one ligature through that nostril from whence the blood is discharged. I also think it right to remark, that a ligature

ture should be attached to the bolster of lint in the pharynx, of a sufficient length to hang out at the mouth, by which the bolster may be withdrawn on the hemorrhagy being stopped : Otherwise, when the bolster is firmly fixed behind the velum pendulum palati, it cannot be removed but with much trouble, both to the surgeon and patient, of which I have met with different instances : In one of these, after various attempts had been made for taking the bolster away, it was allowed to remain for three or four weeks, till it fell into the throat during sleep, when it nearly suffocated the patient before being got out.

SEC.

SECTION III.

Of an OZÆNA.

THE term Ozæna has in general been applied to such ulcers of the nose as are foul; that discharge a fetid matter, and are attended with a carious state of one or more of the bones; whilst by some the same general denomination of ozæna is applied to every ulcer in the nostrils, whether attended with caries or not.—At present I shall adhere to this last acceptance of the term.

Every catarrh affecting the lining membrane of the nose, serves in a greater or less degree to excite an inflamed state of the parts in which it is seated. But this in general terminates easily, and the inflammation is removed by a plentiful discharge either of mucus or thick yellow matter. In some instances, however, even
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after every other catarrhal symptom is removed, this discharge of matter continues obstinate, either from ulceration alone, or perhaps from ulceration conjoined with fulness and swelling of the lining membrane of the nose.

Exposure to cold is to be considered as the most frequent cause of this state of the disease; but external violence of every kind that terminates in an inflamed state of the membrane of the nose, such as the application of acrid irritating substances, blows and bruises, may likewise tend to produce it.

When the system is not otherwise diseased, this is the most simple variety of an *Ozena*; and as in this state we suppose it to be perfectly local, local remedies ought alone to be employed.

In this state of the disease, we trust chiefly to the use of drying and astringent applications. Of these, decoctions of walnut-tree leaves, or of Peruvian or oak bark, mixed with a solution of alum, solutions of white vitriol, and strong saturnine

solutions, are perhaps equal if not preferable to any. Brandy or any other ardent spirits diluted with water, and lime-water, may likewise be employed with advantage.

Dossils of soft lint soaked in any of these should be introduced into the nostril three or four times daily, and pushed up so as to be brought in contact with the diseased parts; and every night at bed-time an ointment should be applied, prepared with a large proportion of calcined zinc or lapis calaminaris.

By a due continuation of these means, almost every local disease, depending on ulceration of the membrane of the nose, will at last be removed. But instances have occurred of other diseases being mistaken for sores in the nose, and of the running produced by them continuing to resist every effort that could be made for removing it. This is particularly the case with collections of matter in the antrum maxillare.

In the anatomical description I have given of these parts, we have seen, that there
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is naturally a passage or opening from the antrum maxillare into the nose immediately below and covered by the os spongiosum inferius of the same side. In collections of matter in this cavity, when large in quantity, it is occasionally discharged by this outlet into the nose in every posture of the body, and almost always when the patient lies on the sound or opposite side, if the passage be not obstructed. The method of treatment best suited for the removal of collections in the antrum maxillare, will be the subject of a section in the next chapter: At present I have only to say, that in diseases attended with a discharge of matter from the nose, practitioners should be on their guard, lest, by mistaking one disease for another, mischief may be done; not only by a misapplication of remedies, but by those means being omitted from whence alone any real advantage could be derived.

When, again, the matter discharged from an ulcer in the nose is thin, fetid, and of a brown or somewhat black colour, as this

gives cause to suspect that the contiguous bones are carious, it would be in vain to expect a cure till these are removed. We may in general know that caries exists, by the peculiar fetor of the matter which the sores afford : but when any doubt remains of this point, we have it commonly in our power to have it ascertained by the introduction of a probe.

As a carious state of the bones of the nose occurs more frequently from lues venerea, than from any other cause, this should be kept in view in every symptom of this kind : And whether we may be able to trace it with certainty as a symptom of this disease or not, whenever there is the least cause for suspicion, the patient should without hesitation be put on a long-continued course of mercury. From whatever cause the disease may have arisen, mercury will not probably do harm ; and as I have seen it prove useful even where no venereal taint has existed, I now in general, in all such cases, advise it immediately.

In

In the mean time, the local treatment of the nose should not be neglected. The parts should be bathed from time to time with one or other of the decoctions I have mentioned; and as the soft spongy bones of the nose are apt, when carious, to produce troublesome fungous excrescences; ointments, impregnated with corrosive applications, should be employed occasionally; and of these there are none I have ever employed that answer so well as prepared verdegris, calomel, or red precipitate. A general prejudice indeed prevails against the use of remedies of this kind in diseases of the internal parts of the nose, from a fear of their doing harm, by irritating the very sensible membrane to which they are applied. There is no good cause, however, for this timidity; and I can say from experience, that ointments, such as I have mentioned, of a strength sufficient for keeping down fungous excrescences, may be employed with much safety, and without any risk of hurting the contiguous parts. It is scarcely necessary to remark,

that in the use of remedies of this kind, some caution is necessary, in adapting the strength of the article to the parts to which it is to be applied. The internal surface of the nose will not bear the same degree of irritation that may with safety be applied to some other parts of the body ; but it will bear the application of corrosive ointments more strongly impregnated than is commonly imagined. A liniment composed of wax and oil, with an eighth or ninth part of red precipitate, may be employed with safety, and the corrosive powers of it can be occasionally increased or diminished ; calomel may be used in a larger proportion, and twenty grains of verdegris may be added to an ounce of liniment. The growth of fungous excrescences being thus prevented, and the sores kept clean by the frequent use of an astringent antiseptic wash, the passage of the nostril will be preserved pervious, the disease will not spread so readily, and the carious bone will be more quickly separated and thrown off
than

than when these circumstances are overlooked.

Till the caries is removed, no permanent cure will take place. The treatment therefore that I have just pointed out should be continued till this is fully accomplished. Indeed, after a sufficient quantity of mercury is exhibited for the removal of any latent venereal taint that might exist in the system, all that we can expect further from art, is to assist in the manner I have advised, in effecting a separation of such bones as are diseased. This being done, the sores will assume a milder aspect, and will in general heal by a continuance of the astringent applications alone.

This is the practice which by experience I have found to answer best in cases of ozæna. It must, however, be acknowledged, that no remedies with which we are acquainted will at all times succeed. This kind of ulcer proves always tedious, not only from the difficulty of reaching the

fore with proper dressings, but from the ossa spongiosa, when they become carious, being always slow in exfoliating. When, however, the system is not otherwise diseased, the means that I have mentioned will very commonly succeed at last.

S E C.

SECTION IV.

Of IMPERFORATED NOSTRILS.

CHILDREN are not unfrequently born with the vagina or anus in an imperforated state; and although we know of no reason why the nostril should not in the same manner be often imperforated at birth, we are certain that it is a rare occurrence. Every practitioner, however, must have met with some instances of preternatural adhesions of the nostrils, the consequence of confluent smallpox, of burns, or venereal sores.

Adhesions of this kind are in various degrees. In some cases the nostrils are only slightly contracted, without producing any material impediment to respiration: In others, they are so much drawn together, that it is hardly to admit a common probe or a small quill: And in a few, the passage is entirely obliterated.

In cases of this kind, it is the object of surgery to remove the cause of obstruction as completely as it can be done, and when an opening is left, however small it may be, much aid may be derived from it in effecting our intention. A small grooved director being passed into the opening, it may be easily enlarged to its natural size, by running a small bistoury or scalpel into the groove, and thus dividing the parts which adhere: But when there is no passage whatever, whether the effect of natural conformation, or of any other cause, we should, in the first place, by slow dissection with a small scalpel, endeavour to discover one of the nostrils, taking care, with as much caution as possible, to keep the opening in a proper direction, between the septum nasi and the contiguous external cartilage: And the passage being once discovered, it must be enlarged to the natural size in the manner I have mentioned, by the introduction of a director and bistoury. This being done in one nostril, we endeavour,

vour, by the same cautious dissection, to discover the other.

A clear opening being thus formed in each nostril, our next object is to preserve it of a full size, and to prevent the parts from adhering again ; which by experience we know they would do, and which much attention alone can prevent.

The introduction of dossils of lint of an adequate size, or of any other soft substance, retaining them till there is no risk of future adhesions, and taking care to withdraw them daily, in order to cleanse or renew them, might answer the purpose : But metallic tubes, adapted to the size of the openings, while they admit of free respiration through the nostrils, serve to distend the parts with more equality, and are more easily retained in their situation. Before being introduced, they should be covered with soft leather spread with any emollient ointment ; by which they fit with more ease, and are more readily withdrawn at the different dressings.

Various

Various forms of tubes have been recommended for this purpose. Those represented in fig. 2. Plate XXX. are of a form that answer perfectly well; and they are easily retained either with a bandage round the head, or with adhesive plasters for attaching them to the contiguous parts. They should be continued as long as any degree of soreness or excoriation remains in the course of the incisions; for if withdrawn before the sores are healed, new adhesions or contractions would very commonly ensue.

It sometimes happens from burns, as well as from the confluent smallpox, that along with a contraction, or perhaps a total obliteration, of one or both nostrils, an adhesion is produced between the nose and skin of the upper lip. In this case, the adhesion of the lip to the nose should, in the first place, be removed with a scalpel; and the sore thus produced should be firmly cicatrised before we attempt to open the nostrils. It is scarcely necessary to remark, that, during the cure, the sore should not
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only be kept properly covered, but with a view to remove any improper contraction which the lip may have acquired, it ought at each dressing to be tied down with several turns of a double-headed roller passed round and over the head.

S E C

SECTION V.

Of POLYPI in the NOSE and THROAT.

THE lining membrane of the nose is liable to excrescences, which, from their supposed resemblance to insects of that name, have commonly been termed Polypi. Every part of the nasal cavity, and of the back part of the throat, is liable to these excrescences; but most frequently they arise from that part of the membrane of the nose that lines or covers the ossa spongiosa. For the most part they are confined to one side of the nose, and they do not commonly appear so far back as the throat; but in some instances they occupy both nostrils, and in others they are so large, as to be distinctly perceived on looking into the pharynx. In some cases, indeed, they are found to arise in the pharynx.

The

The first warning that a patient commonly receives of this disease, is a partial loss of smell, attended with a sensation of fulness or obstruction in some particular part of the nose, very similar to what is experienced from the stuffing of the nostrils in a common cold or catarrh. This continues to increase, till a small tumor or excrescence is perceived in one, and sometimes in both nostrils; which in some instances never descends farther than to be merely perceptible on looking into the nostril; while in others it falls down upon the upper lip, and at the same time perhaps pushes back into the throat.

In some, this elongation of the tumor continues steady and permanent, while in others it retracts altogether within the nostrils in dry weather, and protrudes only in rain, or in thick hazy weather. Indeed, the influence of weather on the size of these excrescences is often astonishing. I have known some patients who in clear dry weather were not known to labour under the disease, in whom the tumors protruded

truded to a considerable length on the least tendency to moist weather.

These tumors are of various degrees of firmness. In a great proportion of cases they are soft and compressible, but in others so firm as to be equally hard with cartilage: All kinds of them are apt to bleed on being fretted or roughly handled; but it is the soft spongy kind only that are so remarkably affected by changes of weather.

The colour of these tumors is likewise variable: For the most part they are somewhat pale and transparent, but in some instances they are of a deep red; and, so far as I have yet had opportunities of observing, I would say, that there is some connection between their colour and texture. The experience of others may lead to a different conclusion; but in the course of my observation it has uniformly happened, that the soft compressible polypus has been of a pale complexion, while those of a firmer texture have always been of a deep red.

In

In the commencement of polypus, the pain is always inconsiderable; and in the softer kinds of it there is seldom much pain, even in its most advanced stages. But polypi of a harder nature become painful as they increase in size, particularly on any cause of irritation being applied to them. In some instances they become unequal and ulcerated over their whole extent. In this state, considerable quantities of a thin fetid matter are discharged; and if a cure be not obtained by extirpation, they are now very apt to degenerate into cancer. It is proper, however, to observe, that it is the firm fleshy kind of polypi only that are apt to become cancerous, and that this change rarely or never happens with those of a soft texture.

But although the softer kinds of polypi seldom end in cancer, and are rarely productive of much inconvenience in their early stages, or as long as they are confined to either of the nasal cavities; yet when more advanced, they are often attended with much distress. Besides the
trouble

trouble arising from their falling down upon the lip, they sometimes pass so far back into the fauces, as not only to impede deglutition, but to obstruct respiration; and in some instances they become so large, as not only to distend the softer parts of the nostrils, but to elevate and even to separate and dissolve the firm bones of the nose. This, indeed, is not a common occurrence; but every practitioner must have met with it, as I have done in different instances.

Various opinions are met with in authors of the cause of polypi. By some they are said to arise most frequently from scrofula; while others imagine, that they proceed most frequently from lues venerea.

I will not say that polypi do not occasionally occur along with the venereal disease and scrofula. They may even be met with as symptoms of these diseases. But in such instances I would consider the general disease of the system in no other light than as an occasional or exciting cause of
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the local affection, for in almost every case of **polypus** a local injury may be traced as the cause of it; and from every circumstance relating to the disease, I conclude, that it is always local and circumscribed. For even where a polypus originates from **lues venerea**, this particular symptom is so far of a local nature, that it remains fixed and permanent after the general taint of the system is removed. Nor is it acted upon by any quantity of mercury that is given.

All the harder kinds of polypi may probably originate from the same causes which produce tumors of a similar texture in other parts of the body; but in most instances they appear to be connected with, and even to proceed from, a caries of the bone beneath; and it is this chiefly which renders them more hazardous, and of more difficult cure than those that are soft, which, in general, I conceive to be produced by a mere distention or relaxation of the *membrana Schneideriana*. When any portion of this membrane becomes inflamed,

either by the effects of cold or from external violence, if in this state any part of its surface is ruptured or eroded, as frequently happens from picking or blowing the nose too forcibly, a degree of weakness or relaxation is produced, that is apt to terminate in a fulness or prominency of the injured parts; and this being increased by every succeeding cold, the disease we are now considering comes in this manner to take place.

The further progress of the disease may depend on various causes; but in general it will advance quickly or slowly, according as the parts affected are more or less liable to inflame. Thus I have known various instances of polypi remaining small and stationary for a great number of years, when the patients have not been much exposed to the open air; while in poor people, who are exposed to every inclemency of weather, and who are therefore more liable to frequent returns of catarrh, they advance with more rapidity.

In

In the treatment of every disease, it is a point of importance to be able to form a just prognosis, not only of the manner in which the symptoms may probably terminate, but of the effects which may result from the remedies that are to be employed for them; and in no instance is this more desirable than in polypous excrescences of the nose.

By some we are led to conclude, that polypi are always doubtful with respect to their termination; that for the most part they are even of a dangerous nature; and therefore that we should consider every person in whom they occur as in a state of hazard: Whilst others assert, that although they may occasionally excite some inconvenience, yet that they are seldom or never attended with risk.

Some, again, are so timid in the treatment of polypi, as to suppose that they ought never to be touched; and allege, that there is more chance of rendering them worse than better, by any operation we can advise for removing them; whilst

by others we are told, that they may be taken away with safety.

This difference of opinion in regard to the nature of polypi, and of the effects of the remedies employed for them, has arisen in a great measure from authors not having distinguished the different kinds of these excrescences with such precision as they ought to have done : For while in one variety of the disease there is little risk to be dreaded, and no great cause to doubt of our being able to remove it ; in others, there is undoubtedly much hazard, and great reason to fear that no remedies whatever will prevent a return of it.

I have already observed, that polypi are of various degrees of firmness ; and all the observation that I have been enabled to make of them, has led me to conclude, that in general the risk with which they are attended, is nearly in proportion to their firmness. The soft compressible polypi are not only less painful than the others, but may at any time be removed with more safety. They are not usually
indeed

indeed attended with pain ; and it seldom happens that any material inconvenience occurs from their extirpation : But the firm fleshy kind of polypi are in general not only painful, but more apt to return after being extirpated. In forming an opinion, therefore, of the probable event of polypi, this circumstance of texture deserves particular consideration. In a soft compressible polypus, if the patient is healthy, we may in every instance give a favourable prognosis ; for as long as the tumor is of moderate size, it seldom proves troublesome, and therefore ought not to be meddled with ; and again, when, by acquiring additional bulk, its removal becomes necessary, it may always be advised with probable hopes of success. But, on the contrary, in polypi that are fleshy, and especially when of a firmer texture than this, the patient or his friends ought always to be informed of the risk being considerable : For it frequently happens that they cannot be entirely removed ; and even when this is easily and completely practicable, they are apt to regenerate,

rate, and in some instances, as I already observed, to end in cancer. In all such cases, therefore, a guarded prognosis should be given; otherwise, if the disease should afterwards return, the operator would be justly blamed, while the operation itself would fall into discredit.

Indeed some practitioners are so averse to this operation in all cases of firm or hard polypi, that they always decline to advise it. As long as they remain stationary, and do not give pain, if they do not obstruct breathing or deglutition, they ought not to be touched: But whenever they become painful, especially when they have acquired such a bulk as to obstruct either the passage to the stomach or lungs, we ought certainly to endeavour to extract them, if this be not already impracticable by their adhering through the whole of their extent to the bones of the nose, and by these being rendered carious; which, in the late stages of the disease, is very frequently the case.

All

All the softer kinds of polypi, which are liable, as I have already described, to be affected by the state of the weather, may frequently be prevented from becoming large by the use of astringent and escharotic applications, particularly by a strong solution of alum or white vitriol, the powder of calcined alum, a decoction of oak-bark, or the application of vinegar or ardent spirits. By one or other of these being applied from time to time over the surface of the tumors, I have known different instances of their increase being checked for a great length of time; and, in some cases, where the remedy has been freely employed, they have at last shrivelled and become less. It must be acknowledged, however, that escharotics seldom or never accomplish a cure; but it is a matter of no small importance, our being able, by gentle means, to render any painful operation unnecessary.

On the first appearance, therefore, of a polypus, we ought, by a free use of some astringent or escharotic application, to en-

endeavour to prevent its farther increase; but when this does not succeed, we are to consider by what mode the tumor may be most effectually removed.

Various methods have been proposed for the removal of polypi:—Namely, the use of caustic or corroding applications;—the actual cautery;—the passing of a seton or cord through the diseased nostril;—excision with a scalpel or scissars;—the application of a ligature round the neck of the tumor;—and evulsion, or extraction by a proper application of forceps.

An ignorance of the circulation of the blood, and of the easy method with which we are now acquainted of putting a stop to hemorrhagies, led in earlier times to the practice of removing tumors wherever they were seated, by corrosive applications, and even by the use of the actual cautery. If this practice was considered as necessary in other parts of the body, it is not surprising to find it proposed for the removal of polypi in the nose, where the effect of hemorrhagies was more dreaded. Cauteri-
sing

ring irons were therefore invented for this purpose, together with metallic tubes for conducting them. But even with the utmost attention the diseased parts cannot be destroyed without injuring the sound. Remedies of this kind are therefore very apt to do harm, so that they are now very generally laid aside; as are likewise all kinds of strong corrosive applications, which are equally liable to uncertainty, by their being apt to spread to the contiguous sound parts of the nose and throat.

As some have imagined that polypi may be removed, by inducing suppuration over their surfaces, it has been proposed to insert a cord of silk or cotton into the diseased nostril, and one end of it being taken out at the mouth, by daily drawing it, and covering that part of it that remains in contact with the tumor, with a slightly irritating ointment, thus to create some degree of inflammation and consequent suppuration over it.

I will readily allow, that in this manner a plentiful flow of matter may be ex-

cited; but it is not probable that this would have much influence on the size of the tumor. Till of late, indeed, it was imagined, that the formation of pus is necessarily attended with a dissolution of the solid parts in which it occurs. Upon this principle Mr Daran and others endeavoured to explain the operation of bougies in obstructions of the urethra; and a similar idea suggested the remedy of which we are now speaking, in polypous excrescences of the nose. But it is now known, as I have elsewhere fully shewn*, that the dissolution of solid parts is by no means necessary for the formation of pus. It is also known, that in diseases of the urethra, bougies prove effectual only by their form, and by the pressure which they produce; and I have no difficulty in saying, that it is in this manner only, by which a cord, if it ever proves useful, can have any effect on polypi of the nose. As the passage of the nostrils is very unequal, being wider in one part than another, and as the roots of polypi

* *Vide* Chapters I. and III.

lypi are frequently so situated that no pressure can be applied to them, I am not of opinion that they can ever be removed by the action of a seton passed through the nose, as many have imagined. But after the extirpation of polypi in the manner I shall hereafter point out, if their roots are not entirely removed, some advantage may be derived from our endeavouring in this manner to clear the passage more completely. It was for this purpose solely, I may remark, that the practice we are now considering was first proposed by that judicious observer Monsieur Le Dran. But although it might, in this manner, sometimes prove useful, yet from being troublesome in the application, it has seldom been employed. We shall have occasion, however, in a subsequent part of this section, to speak of it again.

In other parts of the body, the removal of tumors by excision is universally preferred to every other method; and it would likewise be so in polypi of the nose, were it not for their inaccessible situation. We

seldom indeed find them situated so as to render this mode of treatment practicable; for although scalpels and scissars of various forms have been invented for this purpose, the roots of polypi are in general seated so high in the nostrils, and the passage is for the most part so completely filled by the tumor itself, as to render it always difficult, and often impossible, to remove them by excision.

But when it is found that the tumor rises in the under part of the nostril, and when the point of a scalpel can easily reach the root of it, we ought, without hesitation, to employ this method of taking it away, even in preference to that by ligature: For in this manner the whole of the tumor may be more effectually removed; and in this situation, there is no reason to be afraid of hemorrhagies, as compression can be readily applied to any bloodvessel that may be cut in the under part of the nostrils. We rarely find, however, as I have observed already, that a polypus is seated so far down in the nostrils

is to render this method of treatment practicable.

It therefore appears, that all the means we have yet considered for the removal of polypi in the nose, are either inadequate to the effect, or altogether inadmissible; and hence we are obliged to employ either the method by ligature, or that by extraction with the forceps.

As the removal of polypi by tearing or twisting them off, is attended with much more pain than the application of ligatures round their necks, the latter would always have been preferred, if it had been considered as equally practicable. And as we now know that it can be done in a very safe and easy manner, it will probably in future be very generally employed. The method to which I allude, is that which Monsieur Levrette of Paris first recommended, for the removal of polypi in the vagina, and which we now find may be used with equal propriety in polypi of the nose and throat. The following is the method of applying it in the throat.

Fig.

Fig. 1. Plate XXXI. represents a piece of pliable silver wire passed through a double canula; the wire being sufficiently long when doubled to admit of its passing through the nose in the pharynx. Let the wire be taken from the canula, and the doubling at the end of it be slowly and gently insinuated through one of the nostrils: As soon as it appears in the throat, the operator, with his fingers inserted into the mouth, must open the double sufficiently for passing it over the pendulous extremity of the tumor; and having pressed it down to the neck or root of it, the two ends of the ligature hanging out at the nostril must be again passed through the canula; which is now to be pushed back along the course of the wire, till it comes in contact with the root of the polypus. The fingers should still be continued in the throat, to retain the ligature at the root of the tumor; and the canula being placed in the manner I have advised, the wire must be drawn tight; and the ends of it being fixed on the wings or handle of the canula,

cula, as in Plate XXXII. fig. 1. it must be left in this situation till the following day, when being again drawn somewhat tighter, and this being daily repeated, the tumor will fall off sooner or later, according to its size. When small, it sometimes drops off in the course of the second day; and tumors even of a large size often come away on the third or fourth. It is better, however, to make the compression more gradual; for, when the wire is drawn with much force, instead of acting as a ligature, and removing the tumor by compression, it removes it too quickly, by cutting it across, and may thus be equally productive of hemorrhagies, as if the operation had been done with a scalpel.

In this manner, all those polypi may be removed, which either originate in the throat, or that proceed back from the nostrils into the fauces; and the practice may be extended even to those that are deeply seated in the pharynx, if the ligature can be properly applied over them, either with the fingers, with the assistance of

of

of forceps, or with an instrument, such as is delineated in Plate XXXIII. fig. 3. Some instances, indeed, have occurred, of excrescences seated too deep in the œsophagus, for admitting of ligatures being used in this manner; nor is it admissible even where the upper part of the tumor is accessible, if the base or neck of it be so low down as to prevent the ligature from being applied to it. In the Third Volume of the *Physical and Literary Essays of Edinburgh*, there is a case related, in which a very ingenious method was put in practice by the late Mr Dallas, for surrounding deep seated polypi with ligatures; and although instances of such excrescences are rare, yet, as they are sometimes met with, I think it right to give a delineation of the instrument which in this instance was successfully employed.

In this case both breathing and deglutition were impeded by a large fleshy excrescence in the œsophagus, a considerable portion of which was thrown into the mouth, by every exertion to vomit; but it
soon

soon retracted and remained concealed within the pharynx till vomiting or retching was again excited. This portion of the tumor, which occasionally protruded, was removed by the method to which I allude, and which I have more particularly described in the explanation to Plate XXXIV. The patient was in this manner relieved from much inconvenience and distress; but another branch of the tumor that extended towards the stomach, becoming afterwards very large, he died of the effects of it in about two years from the operation.

I think it right to remark, that this patient might probably have been saved by the use of the ligature and double canula, such as I have described, and that in similar cases it is to be considered as perhaps the best means of relief. When a polypus is suspected to have formed in the œsophagus, if no part of it is observed to protrude into the pharynx, there will be much cause to imagine that it proceeds down towards the stomach; so that, if

the double of a piece of flexible wire be pushed down the œsophagus, the pendulous part of the tumor may be laid hold of in withdrawing it; or, if one attempt should fail, other trials may safely be made with it: And as soon as the double of the ligature is found to be firmly fixed, all that portion of the tumor which it surrounds may be easily removed by the application of the double canula, in the manner I have advised. It is proper, however, to observe, that the ligature and canula should both be carried through one of the nostrils into the œsophagus; for in this manner they will not prove so troublesome as when passed through the mouth, and they may be applied with equal ease and advantage. For this purpose the canula must have a slight degree of curvature, as is represented in Plate XXXI. fig. 2.

In a great proportion of cases, ligatures may be applied round polypi of the back part of the nose and throat, in the manner I have advised, and without interrupting respiration; but when deeply seated in the œsophagus,

ophagus, and on all occasions when the application of the ligature is difficult and tedious, it is proper to secure an easy and free respiration during the operation, by previously advising bronchotomy. By this

additional risk is incurred, for it may be that ease and safety be accomplished; and puts it in our power to finish the operation more perfectly than we otherwise could do. It is likewise proper to remark, that although the operation may often be done without any assistance from a speculum oris, yet, whenever it proves tedious, and when the ligature cannot be easily applied, this instrument should be employed.

I have now to mention the method of applying a ligature to a polypus seated in the anterior part of the nose, and which, instead of passing back into the pharynx, proceeds down one of the nostrils towards the upper lip. Let the double of the ligature be passed over the most depending part of the polypus, and be slowly pushed to the root of it with the slit probe,

Plate XXXIII. fig. 2. The probe being given to an assistant to preserve the ligature in this situation, the two ends of it must be passed through a double canula; which being inserted into the nostril on the opposite side of the polypus, and being pushed easily along till it reaches the root of it, the ligature must now be drawn so tight as to make some impression on the root of the tumor, when the ends of it must be tied to the wings of the instrument, and daily pulled somewhat tighter, till the tumor drops off.

In this manner almost every polypus in any part of the nose may be extirpated. Those who have not seen it put in practice, may be apt to doubt of this assertion; but a few trials will shew that it is not only the most effectual method, but the safest and easiest that has yet been proposed for removing polypi of every kind: It also has the advantage over every other method of applying ligatures upon polypi in the nose, of answering equally well in the large as in the smaller kinds of them; and it may even

ven be applied where the tumor is so large as to distend the nostril to a considerable size. In Plate XXXIII. fig. 1. there is delineated a remarkable form of polypus extirpated in this manner, under the direction of Dr Monro, who was the first, I must observe, who put in practice this method of removing polypi from the nose and fauces. This polypus filled the nostril completely ; to such a degree, indeed, that it could not have been removed in any other manner ; not even with forceps, for the blades of the instrument could not have been inserted.

Besides this, another method has been proposed of applying ligatures round polypi in the nostrils : By introducing a ligature through the nostril in which the tumor is seated, pushing it back to the root, and passing it in such a manner, that the doubling may include the root of the polypus, if the opposite ends of it be taken out at the mouth, they may be sufficiently twisted, it is alleged, for removing the tumor.

In a few cases this might possibly answer, but it would often fail: I think it right, however, to mention it, from its being recommended by a very judicious practitioner, Mr Cheselden. Fig. 2. Plate XXXII. exhibits a representation of a polypus surrounded with a ligature in this manner.

Various forms of forceps have been invented for the purpose of removing polypi. Those that answer the intention best, and now most generally used, are represented in Plate XXXV. Those of a straight form are intended for extracting polypi by the anterior nares, and the crooked forceps are employed by some for the removal of those excrescences which pass into the throat behind the uvula. I have shewn indeed that polypi of this kind may be more easily removed with ligatures, but I think it right to delineate such forms of forceps as are used by those who prefer a different method.

In proceeding to extract a polypus with forceps, the patient ought to be firmly seated,

seated, with his head leaning back, and supported by an assistant behind; and as it is of much importance, our being able to discover, as nearly as possible, the origin of the excrescence, some advantage may be obtained from the face being placed in such a manner that the light of a clear sun may fall into the nostril.

In the ordinary method of performing this operation, the surgeon now takes the forceps, fig. 2. Plate XXXV. and inserting one of the blades on each side of the polypus, he carries them easily along till he brings their points as near as possible to the neck of it, when he lays hold of it firmly, and endeavours to extract it entire, either by pulling directly downwards, or by moving the forceps from one side of the nostril to another; or, as some more properly advise, by turning or twisting the polypus round, till it is completely separated. By this last method I think it probable, that the root or attachment of the excrescence will be more readily loosened than in any other way, at the same

time that that part of the lining membrane of the nose will not be so much injured as when the tumor is torn away by being pulled either laterally or in a perpendicular direction downwards.

When a polypus is of a firm texture, if the operation is properly conducted, we may frequently be able to bring it all away at once: But when soft and yielding, it commonly requires repeated applications of the forceps; and we should never desist, as long as any portion of it remains that can with propriety be removed.

It is proper, however, in this place, to observe, that the first application of the forceps is commonly attended with the discharge of so much blood, that beginners are apt to desist before the operation is nearly finished, from their being afraid of fatal consequences from the hemorrhagy; but this ought not in general to be regarded, as long as, by a farther use of the forceps, we can extract any more of the polypus. And even when the operation is finished, if the patient is in any degree plethoric,

plethoric, some advantage may ensue from a farther discharge, by which inflammation may be prevented, which otherwise might produce very troublesome consequences. Profuse hemorrhagies from this operation seldom happens ; by no means so frequently as those are apt to imagine who have not often had occasion to practise it. I will not pretend to say that instances may not occur of more blood being lost by it than is proper ; but I can safely assert, that it is not a common occurrence. When it is found, however, that the hemorrhagy is proceeding too far, we should immediately employ those means that we know from experience are most effectual in putting a stop to it ; but these having already been fully considered in Section III. of this Chapter, it is not necessary to enter upon them at present.

As it sometimes happens that part of the roots of polypi are not extracted by the forceps, we are desired by some practitioners to destroy them, by inserting caustic or corrosive applications into the

nostrils immediately after the operation. Unless, however, we can evidently observe the spot on which the caustic should be applied, I am clearly of opinion that this practice should not be adopted; otherwise we must work entirely at random, and will more probably do harm than good. But when, by exposing the nostril to a clear light, we can bring the seat of the excrescence into view, we may with propriety touch any parts of it that remain with lunar caustic, properly covered with a canula, in order to protect the contiguous sound parts. An instrument for this purpose is represented in fig. 1. Plate XXXIV. This, however, should not be attempted on the day of the operation, as is commonly advised; for while any discharge of blood continues, a clear view of the parts cannot be obtained: But it may with propriety be done on the following day; and the caustic should be repeated every second or third day, as long as any remains of the excrescence are observed.

When,

When, again, the root of a polypus lies so deep that it cannot be discovered, if we find, either by the introduction of a probe, or by the breathing through the nostril not being free, that the excrescence is not entirely removed by the forceps, although, for the reasons I have mentioned, caustic should not in this situation be employed, it may be highly proper to destroy it by means of a more harmless nature. In this case, the practice I have described, of passing a seton through the nostril into the throat, might sometimes answer, but the frequent application of large bougies succeeds with greater certainty. In one of the following Chapters I shall have occasion to remark, that in the removal of obstructions in the urethra, bougies seem to operate chiefly by mechanical pressure; and there is cause to imagine, that upon the same principle they may be employed with advantage for the removal of those parts of polypous excrescences in the nostrils that cannot be taken away with the forceps. Nay more, were
we

we consulted early in the disease, before the excrescences have become large, they might, I think, be successfully employed in preventing their further increase; and if duly continued, they might, in some instances, in this incipient state of the disease, remove them entirely. Practitioners, however, are seldom advised with, till the disease has gone too far to admit of this. I have only had one opportunity of trying it; but in this case, the effects of it were such as to justify our putting it to the test of future experience.

This was the opinion that I published of this remedy several years ago, and since the first editions of this work were printed, I have had many opportunities of putting it to trial. In all it gives great relief, by enabling the patient to breathe more easily through the nose, and in some it has entirely removed the disease. It is not, however, the common bougie that I employ, but a piece of bougie plaster rolled up into a flat form, nearly of the breadth and thickness of the forefinger of
of

of an adult ; and of a length to pass into the pharynx, while half an inch or thereby remains out of the nostril. The plaster should be of a firm consistence ; the bougie perfectly smooth ; and if well covered with oil, it may be easily passed, even where the excrescence is so large as to fill a considerable part of the nostril : The patient is soon able to insert it himself, and by doing it every night at bedtime, and withdrawing it in the morning, it gives him little trouble in the application, while it commonly soon affords relief to the state of his breathing.

The person in whom this mode of treatment was first employed, had for several weeks complained of a kind of stuffing, and interruption to breathing in one of his nostrils. On looking into it, I clearly saw and touched with the probe, a small, pale coloured, soft polypus, at a considerable depth. As it did not yet produce much inconvenience, I did not think of advising it to be extracted ; but considering it as a fit case for trying the effects

of compression, a roll of bougie plaster was passed into the nostril; and being gradually increased in size, the passage at last became clear and pervious; and in the course of seven or eight weeks, the excrescence disappeared almost entirely: But the patient was at this time obliged to go abroad, and I have not since that period heard of him.

In the latter part of the treatment of this case, a silver tube covered with plaster was employed; by which the breathing went freely on; and being of such a length as to pass into the pharynx, it was easily kept inserted, and was prevented from falling out, or from passing back to the throat, by a piece of adhesive plaster, connected with it by means of a strong thread being applied across the upper lip.

In describing the operation of extracting polypi, I have supposed that the forceps in common use are to be employed; and when the excrescence is small, they answer the purpose as well as any other:

But

But when the polypus is so large, as nearly to fill the nostril, they cannot be either easily or properly applied: For the two blades of the forceps being both introduced at once, they cannot but with much difficulty be pushed deep into the nostril already much obstructed; and the more they are pressed forward upon the excrescence, and the nearer the end of it is brought to the axis of the instrument, the more widely the blades of it are necessarily opened at their extremities; by which the tumor cannot be so equally compressed, nor is there such a chance of extirpating the root of it by means of them, as if they were so constructed as to apply pressure equally through their whole length.

To remedy these inconveniencies, several improvements have been proposed; but the best that I have met with is one by the very ingenious Dr Richter of Göttingen. A representation of it is given in Plate XXXV. fig. 3. This instrument may be used in the ordinary way, by introducing

introducing both blades at once, when the polypus is small; but when the tumor is large, it answers better to introduce the blades separately, as is done with midwifery forceps. One of the blades being carried slowly and cautiously forward along the course of the polypus, the other must in like manner be introduced at the opposite side of it, so that they may now be firmly locked together at the joint. The blades are accordingly made to separate easily, and to fix in such a manner, as to admit of their being employed in the way that I have mentioned.

These, and every other variety of forceps employed for this operation, ought to be as thin and slender in that part of them which is inserted into the nose, as the nature of the disease will admit; for I must again observe, that the straitness of the part in which the instrument must move, is one of the principal difficulties we have to encounter. But when the forceps are made of well-tempered steel, they need

ed never be so thick and bulky as they
are commonly made.

When, however, polypi have acquired
large size, the obstruction they produce
the nostril is in some instances to such
degree, that no forceps can be inserted:

such circumstances, as a considerable
relief may be gained by laying the nostril
open, it may in some instances be proper
to divide the cartilaginous part of it by
longitudinal cut; and, after extracting
the tumor, to reunite the divided parts ei-
ther by adhesive plasters, or with one or
more sutures.

In mentioning this, however, I think it
right to observe, that it is a measure
which ought not in any instance to be
lightly adopted; but I also think, that it
should not be universally condemned, as we
find it to be by some practitioners. I do not
imagine that it would in every case prove
successful: But when a polypus has alrea-

become so large as entirely to fill the
nostril; when, therefore, no forceps can

be inserted for removing it ; when the tumor is still continuing to increase ; and when of course there is much reason to suspect, that it may terminate fatally if it be not extracted ; it will surely be better to give the patient any small chance that may be derived from the practice I have proposed, than to leave him to die in misery, which in all probability he would do were no attempt made for his relief. If, on laying the nostril open, it is found that the tumor can be with safety removed with forceps, a complete recovery may possibly be obtained ; and thus the pain that the patient has suffered, and the trouble of the operator, will be amply rewarded, whilst no material injury will be done, nor any kind of risk incurred, if, on laying the parts open, it is unfortunately found, that no part of the tumor can with propriety be taken away.

In the firm fleshy kind of polypi, which in some instances degenerate into cancer, when it is found that the tumor is already
in

a state of ulceration, and that the contiguous cartilages and bones of the nose diseased, it would no doubt be imprudent to advise the treatment I have mentioned, for no advantage would probably accrue from it; the patient would be made suffer a great deal of unnecessary pain; and the operation itself would be brought to disrepute: but in the softer kinds of the disease, which rarely or never become cancerous, and when the more external bones and cartilages of the nose are not affected, we ought without hesitation to attempt it, when the tumor, as is here supposed to be the case, is meant to be removed with the forceps, and when this cannot be done in any other manner.

In the case of a firm fleshy excrescence, which filled the nostril so completely that the forceps could not be introduced for removing it, a method was put in practice by Dr Richter for reducing the size of it; which to a certain degree answered the purpose, and afforded considerable relief.

relief. A hole or opening was made through the centre of the excrescence pushing a common trocar through the whole length of it, after being made hot and covered with a canula. By this means a passage was formed through which the patient breathed easily, and the tumor was much lessened; but the Doctor was unfortunately prevented from attempting to complete the cure, either by extraction or otherwise, by the patient leaving the place.—This case, however, affords an useful practical hint, and points out a mode of treatment, which in tumors of this particular kind, may in some instances be successfully employed *.

I have thus described the method of extracting polypi of the nose with the forceps; but I must again remark, that the

* For a more particular account of this case, and the forceps mentioned above, vide Augusti Gottlieb Bartsch's Observationum Chirurgicarum fasciculum secundum. Gottingæ, 1776.

may be removed both with more ease and **safety** with ligatures ; and as this mode of **operating** is admissible in a great **proportion** of cases, it seems only to require to be **more** generally known, to be very **universally** preferred.

SECTION VI.

Of Extirpation of the Tonsils.

THE Amygdalæ or Tonsils are frequently, even in a natural state, so large as almost to fill up the passage from the mouth to the throat. As long, however, as they remain sound, and are not attacked with inflammation, any inconvenience that they produce is seldom of much importance: But tonsils of this enlarged size are very apt to inflame on the patient being much exposed to cold; and frequent returns of inflammation are often attended with such an addition of bulk, as to produce nearly a total obstruction to the passage of food, drink, and air.

It is this enlarged state of the amygdalæ that in general is termed a schirrous state of the Tonsils; but I think it right to observe,

serve, that the term Schirrous appears here to be very improperly applied ; for, excepting the circumstance of a firm tumor, every other characteristic of schirrus is here very commonly wanting. A real schirrus is attended with frequent shooting pains, and it very commonly terminates in cancer : Now we know, that pain very seldom occurs in cases of enlarged tonsils, except from inflammation : While in an inflamed state, they are frequently indeed very painful ; but as soon as the inflammation subsides, no more pain is experienced, and they remain perfectly easy and indolent till the patient is again exposed to cold. This, however, is never the case with swellings of the real schirrous kind ; for whenever they become painful, they uniformly proceed to turn worse : And, again, enlarged tonsils are seldom or never known to terminate in cancer. I never knew an instance of their doing so ; and few practitioners, I imagine, have met with it.

Mr Sharpe, when treating of this subject, recommends a more frequent extirpa-

tion of enlarged, or what he terms Schirrous Tonsils, than what has hitherto commonly prevailed; and he is induced to do so, from having observed that the disease never returns, as it too frequently does after the extirpation of schirrous tumors in other parts. His words being much in point, I shall transcribe them. "All other tumors of the schirrous kind, whether of a scrofulous or cancerous nature, are subject to a relapse; the poison either remaining in the neighbourhood of the extirpated gland, or at least falling on some other gland of the body. In this case, I have never met with one such instance; and the patient has always been restored to perfect and lasting health *."

Mr Sharpe has here communicated a very interesting fact; the more valuable, by coming from a man of high reputation, and whose practice was very extensive. By many, however, the truth of his assertion has been doubted, from its being universally

* Vide Critical Inquiry, &c. by Samuel Sharpe.—Fourth Edition, sect. vii.

It is universally known that schirrous tumors frequently return in other parts of the body after being extirpated. It would indeed be surprising to find the extirpation of schirrous tonsils prove always successful when the same operation often fails when practised for similar affections in other parts. But the explanation I have given, sets it in a more distinct point of view. These tumors of the amygdalæ, commonly termed Schirrous Tonsils, are not of the true schirrous nature ; and hence it is, that they never degenerate into cancer, nor return after extirpation ; and this is accordingly a very weighty argument for removing them as soon as they become so large as to impede either deglutition or respiration. Till this, however, takes place to a considerable degree, no practitioner ought to advise this operation ; for, as it is attended with a good deal of pain, it should be avoided as long as the safety of the patient does not require it ; but whenever the tumor becomes so large as to produce much interruption to the passage of food
and

and air, we should not hesitate to advise it.

Different methods have been proposed for removing enlarged tonsils.—Some have advised the repeated application of the actual or potential cautery : Others recommend excision with the scalpel or crooked scissors : And, lastly, it has been proposed to do the operation with ligatures.

Caustic, however, should here be considered as inapplicable, from the impossibility of using it without injury to the neighbouring parts ; and we are debarred from the use of the knife and scissors by the profuse hemorrhagies that sometimes occur from excision. Necessity, therefore, obliges us to employ the ligature ; and with due attention, almost every tumor may be removed by means of it with which the amygdalæ are attacked.

In the last section I have given a detail of the best method of applying ligatures to polypous excrescences in the throat, and it likewise appears to be the easiest and best method of forming ligatures upon
tumors

tumors of the amygdalæ. It ought to be done with pliable silver-wire, but catgut of proper strength will likewise answer; and although the double canula to be passed through the nose might be of a straight form, it will answer better if somewhat crooked, as in fig. 2. Plate XXXI.

The double of a ligature, formed of pliable silver-wire or catgut, being inserted into one of the nostrils, must be pushed back till it reaches the throat, when the operator, introducing his fingers at the mouth, must open the ligature; and having passed it over the tumor, it must now be pressed closely down to the root of it. In this situation, he must continue to preserve it with his fingers; while an assistant having inserted the two ends of the ligature into the canula, must push it easily into the nostril, till the farther end of it is either seen or felt in the throat; and the wire being now pulled so tight as to fix it in the substance of the tumor, the ends of it hanging out at the other end of the canula must be tied in the manner pointed out

out in the last section, to the wings or handle of the instrument ; and the ligature being made tighter from time to time, the swelling will soon fall off.

The more pendulous the tumor is, the more easily will the ligature be fixed. But however broad the base of it may be, it may with little difficulty be done ; for the swelling is always prominent : So that when the double of the wire is fairly passed over, it may easily be pushed down to the base with the fingers ; and being preserved in this situation till pulled sufficiently tight, it will not afterwards be in danger of moving.

I have advised the ligature to be first carried through the nose before being put over the tumor. It might be inserted by the mouth ; but in this manner more inconvenience would ensue from the ligature and canula hanging out at the mouth during the cure. This method, however, may be tried when any difficulty occurs in applying the ligature by passing it through the nose.

For

For the most part we find both tonsils nearly equally enlarged, and in some cases the removal of one of them forms a sufficient opening for the passage of the food; but when it becomes necessary to extirpate both, it answers better to allow the inflammation and tension induced by the removal of the first, to subside entirely before attempting to remove the other.

This mode of applying ligatures upon these tumors, is in my opinion the best; but it may often be done in a different manner. Let a ligature sufficiently strong be formed of waxed thread, and carried round the tumor either with the fingers or a split probe, such as is represented in Plate XXXIII. fig. 2. A noose is now to be made on it, by which a knot of any degree of tightness may be tied, by fixing one end of the thread at the side of the tumor in the throat, with the instrument, fig. 2. Plate XXXVIII., while the other is firmly drawn with the other hand of the surgeon out of the mouth.

This method was first put in practice by Mr Cheselden; and since that period by Mr Sharpe and others. Where the tumor has a broad base, in order to fix the ligature, a needle with an eye near the point, such as is represented in Plate XXXVIII. fig. 3. was likewise proposed by Mr Cheselden. A double ligature being put into the eye of the needle, the instrument is pushed through the centre of the tumor near to its base, and the threads being disengaged with a pair of forceps, the needle is withdrawn. In this manner two ligatures are to be formed, each of them being made to comprehend one half of the tumor by one of the threads being tied above, and the other below.—The instrument, fig. 2. of the same Plate, is likewise necessary here.

Although it is proper to mention this method of fixing ligatures upon tumors of the tonsils with broad bases, it will not probably be often employed. The double canula renders it unnecessary, as we can apply, by means of it, such a degree of
force

force as will at once fix the ligature in the substance of the swelling: Even when the operation was done in a manner that did not admit of the ligature being so firmly fixed as may be done with the double cannula, Mr Sharpe was of opinion, that Mr Cheselden's method of performing the operation was unnecessary. His observation on this point is, "That he had never in one instance found it necessary to employ the double ligature recommended by Mr Cheselden *."

By whatever method, however, the operation is performed, the tumor will not in every instance fall off by the first ligature; in which case, another must be applied, and continued till a cure be obtained.

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* Vide Mr Sharpe's Treatise on the Operations of Surgery, Chapter xxxii.

SECTION VII.

Of the Extirpation of the Uvula.

THE Uvula, by frequent attacks of inflammation, as likewise from other causes, becomes in many instances so relaxed and elongated, as to excite much distress, not only by impeding deglutition, but by irritating the throat so as to induce cough and retching.

Slight degrees of enlargement of this part may in general be removed by the frequent use of astringent gargles, composed of strong infusions of red rose leaves,—Peruvian bark,—or oak bark, with a proportion of alum or vitriolic acid; and as long as remedies of this kind answer the purpose, no others should be advised. But when these fail, and when the uvula becomes so large as to create much distress, we depend on extirpation alone for a cure.

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The uvula may be extirpated either with ligature or by excision. By the last, the parts affected are quickly removed, and the patient obtains immediate relief; whereas the other is not only slow in its operation, but is applied with difficulty. Yet by excision, troublesome hemorrhagies sometimes occur, while no risk whatever arises from ligatures. Some practitioners would allege that no danger can ensue from any hemorrhagy that takes place in the removal of the uvula by excision; but although this may frequently happen, yet I know from experience that instances of the contrary sometimes occur, and that large quantities of blood have been lost by this operation. This will most readily happen where the uvula is much enlarged, and where of consequence the vessels with which it is supplied are in an enlarged state. Where the uvula is merely elongated, there will seldom, I imagine, be much risk in removing it by excision. In this state, therefore, of the disease, excision should be preferred; but

when the parts to be removed are much increased in bulk, it answers better to do it with ligatures.

Different instruments have been invented for cutting off the uvula. The one that has been most frequently used is represented in Plate XXXIX. fig. 1. But neither this, nor any other of a similar form, answers the purpose so well as a curved probe-pointed bistoury, such as is delineated in fig. 3. of the same Plate. Or the operation may be very easily done with scissars of the common form, or with a curve, such as is represented in Plate XXXVI. fig. 2.

When any of these instruments are employed, the mouth being first secured with a speculum, such as is represented in Plate XLI. fig. 1. the uvula should be laid hold of with small forceps, or with a sharp hook, by which it will be more easily cut off than if left loose in its natural pendulous state. After the operation, if much blood is discharged, it may be restrained by the use of an astringent gargle; by the application

application of ardent spirits; or even by touching the bleeding vessel with lunar caustic. It will seldom happen, however, that any precaution of this kind is necessary; for a moderate flow of blood will never do harm, and more than this will rarely occur where the parts are not much enlarged. When, again, a ligature is to be employed, the mode of fixing it described in the last section may be adopted: It may be done by the double canula passed through one of the nostrils;—or the canula may be introduced at the mouth;—or it may be done by the method employed by Mr Cheselden for applying ligatures upon the tonsils, also described in the last section. After passing the ligature round the tumor, which in general will be easiest done with the fingers, a knot may be tied on it in the manner I have there directed, with the instrument, fig. 2. Plate XXXVIII.

I have likewise thought it right to represent another instrument, hitherto almost the only one employed for fixing a ligature upon the uvula, Plate XXXI. fig. 3.

From the name of the inventor, it has commonly been termed the Ring of Hilanus. The invention is very ingenious; and by means of it a ligature may be firmly applied upon the uvula: But the same intention may be accomplished in a more simple manner by either of the other methods described above; so that this will prove to be of little use.

SEC.

SECTION VIII.

Of Scarifying and Fomenting the Throat.

It frequently happens in inflammation of the amygdalæ and contiguous parts, that scarifications become necessary; in the first place, for lessening the degree of inflammation by inducing a topical discharge of blood; and afterwards for the discharge of matter contained in abscesses, when suppuration has not been prevented by the means usually employed for this purpose.

In Plate XL. figures 1. and 3. I have delineated different forms of instruments for this purpose: The wings with which fig. 1. is furnished, are meant to compress the tongue, while the scarificator is employed in the back-part of the mouth. With either of these, scarifications may be made, or abscesses opened, in any part of the mouth or throat with entire safety.

In the treatment of inflammatory affections of these parts, we often find it necessary to recommend fomentations; a remedy which proves also useful in catarrhal affections of the trachea and lungs. Various methods are proposed for conveying steams to these parts; but the best that has yet appeared, and it is likewise the neatest and most simple in its construction, is the instrument delineated in Plate XL. fig. 2. the invention of Mr Mudge of Plymouth. By means of it, the throat, trachea, and lungs, may be very effectually fomented by drawing warm steams into them, and without any difficulty or inconvenience to the patient, who may lie in bed during the whole operation.—This instrument I consider as so highly useful in the treatment of every case of catarrh, that I think every family should have it.

CHAPTER XIII.

Of DISEASES of the LIPS.

SECTION I.

Of the HARE-LIP.

NATURAL deficiencies are not so frequent in any part of the body as in the lips. Children are often born with fissures in one of the lips, particularly in the upper lip. In some instances this is attended with a want or real deficiency of

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parts ;

parts; in others we only meet with a simple fissure or division; whilst in some again, there is a double fissure with an intermediate portion of the lip between them. Every degree of this affection is termed a Hare-lip, from a resemblance which it is supposed to bear to the lip of a hare.

For the most part this fissure or opening is confined to the lip itself: But it often extends back along the whole course of the palate, through the velum pendulum and uvula into the throat; and in some instances the bones of the palate are either altogether or in part wanting, while in others they are only divided or separated from each other.

Every degree of the hare-lip gives much deformity, and it sometimes prevents a child from sucking: It is always productive of some degree of impediment of speech; and when the division extends along the bones of the palate, the patient is much incommoded both in chewing and swallowing, by the food passing readily

ly up to the nose. When in the under lip, which is not often however the case, it commonly prevents the saliva from being retained.

These are all very urgent reasons for an early removal of the hare-lip being attempted: Where it interrupts, indeed, the suckling of the child, the operation must either be done immediately, or the child must be fed with a spoon; but by practitioners in general, we are desired at all events to delay the operation to the third, fourth, or fifth year; lest the crying of the child should render the means employed for obtaining a cure altogether abortive.

This reason, however, does not appear to be of importance; for till the child arrives at his twelfth or fourteenth year, when we may suppose him to be possessed of sufficient fortitude for submitting easily to the operation, the same objection holds equally strong: Nay, a child of six or eight years of age is in every respect more difficult to manage than one of six, eight, or twelve months. I am therefore
clearly

clearly of opinion, that in a healthy child the operation should never be long delayed; for the more early it is performed, the sooner will all the inconveniencies produced by the disease be removed; and now, after various trials, I find that it may be done even in very early periods of infancy, perhaps in the third or fourth month, with the same prospect of success as in any period of life. I have done it in the third month with very complete success, but the twelfth or thirteenth answers better.

Practitioners all agree in regard to the intention of this operation, which is to cut off the sides of the fissure so as to reduce the whole of it to the state of a recent wound, and then to draw them together, and retain them in contact till they unite. But although the principles on which this practice rests are universally admitted, authors are of very opposite opinions in regard to the best method of carrying it into effect. By some we are advised to employ the interrupted suture for retaining the
sides

sides of the fissure : Others prefer the twisted future : Whilst by many, futures of every kind are said to be improper ; and that a cure may be always obtained with adhesive plasters, or bandages ; by which means a great deal of pain would no doubt be avoided, which futures are always sure to excite.

This is a point of much importance, and therefore merits particular discussion ; more especially as it has been warmly contested even by surgeons of reputation.

In the treatment of every disease, our principal object is to obtain an effectual cure ; but every practitioner will allow, that the easiest mode of effecting this should be preferred. On this principle, much pains have been taken to shew, that futures are seldom necessary in wounds of any kind, especially in the cure of the hare-lip ; and in support of this opinion, various cases are recited of cures being performed with bandages alone : Nay, some have gone so far as to assert, that in
every

every instance of hare-lip a cure may be obtained with more certainty with a bandage than by futures ; for they allege, that the irritation produced by futures serves in a great measure to counteract the very purpose for which they are employed. After the edges of the fissures are cut off or rendered raw, the contraction of the adjoining muscles is the only difficulty that we have to encounter ; and this, we are told, instead of being removed by futures, is always increased ; while the same intention, it is said, may be accomplished with no inconvenience whatever, by a bandage applied in such a manner as to keep the edges of the sore in close contact, which it does by supporting the contiguous parts so as to prevent the reaction of the muscles with which they are connected.

That a hare-lip may be completely cured with the uniting bandage, or even with adhesive plasters alone, there is no reason to doubt ; and being attended with less pain than the method of cure by futures, it ought in every case to be preferred, if
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with equal certainty it could be relied on: But although with much pain and attention, we might in some instances be able to accomplish a cure, with plasters and bandages ; yet, from the nature of the remedy, there is cause to imagine that it would frequently fail ; for in the cure of the hare-lip, if every point of the parts meant to be united be not kept in contact till complete adhesions take place, our intention is always frustrated, and nothing afterwards answers the purpose, but a repetition of the operation in all its parts. The edges of the fore must be again rendered raw, and the patient must submit, either to another application of the bandage, or to the use of futures ; which, if employed at first, might have saved much trouble both to himself and the operator : For it is proper to observe, that in cases where the operation is applicable, the method of cure by futures, when rightly conducted, never fails ; at least I have never known an instance of its doing so. It sometimes happens, indeed, that the deficiency of parts
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is so great, as to render it impossible by any means to keep them in contact ; and if sutures are employed in cases of this kind, they will no doubt fail. This, however, is not the fault of the remedy, but of the operator, in using it in an incurable variety of the disease.

As I have had often occasion to put this operation in practice, and being at first prepossessed in favour of the method of cure by bandages and plasters, I gave them both a fair trial ; and the result was exactly what I have mentioned. I found, that by a proper application of bandages and plasters, a complete cure might in some instances be obtained, but that the greatest care and attention could not ensure success ; and finding that disappointments never occur from the use of sutures, I have now laid every other method aside ; and hitherto I have had no cause to regret my having done so. I shall therefore proceed to describe the operation as it ought to be performed with sutures ; and as none of the methods by bandages or sutures will
ever

ever probably be received into general use, it would be considered as superfluous to give an account of them : And besides, our doing so here is unnecessary, as the subject has already been fully treated of by various authors of reputation, particularly by Monsieur Louis of Paris, who has given a paper in the 4th Volume of the Memoirs of the Royal Academy of Surgery, that contains every argument that has been suggested in favour of this method of curing the hare-lip with bandages.

In proceeding to the operation, the patient, if an adult, should be seated opposite to the light, with his head properly supported by an assistant ; but if a child, he will be more firmly secured if laid upon a table, and kept in a proper posture by an assistant on each side.

The upper lip should now be completely separated from the gums beneath, by dividing the frenum that conjoins them. This admits of the lip being more equally stretched ; and when one of the fore-teeth is found opposite to and projects into the

fissure, as sometimes happens, it ought to be taken out, otherwise it will irritate and stretch the parts if allowed to remain. In some instances, too, especially when the fissure runs through the bones of the palate, a small portion or corner of bone is found to project from one or both of the angles. This should likewise be removed; and it may be easily done with pliers or forceps, which should be both firm and sharp, as is represented in Plate XLIII. fig. 2.

These preparatory steps being adjusted, the surgeon, standing on one side of the patient, must take one side of the lip between the thumb and fore-finger of his left hand; and desiring an assistant to do the same with the opposite side, and to stretch it somewhat tightly, he should with a scalpel make an incision from the under border of the lip up to the superior part of it; in which he must take care to include, not only all the parts immediately concerned in the fissure, but even a small portion of the contiguous sound skin and parts beneath:

And

And this being done on one side, a similar incision must be made on the opposite side; which ought to be of the same length with the other, terminating in the same point in the upper part of the lip. By this means, if the operation is rightly done, a piece, including the fissure completely, will be cut out, of the form of the letter *V* inverted; and the deficiency will in every part of it have the appearance of recent wound.

With a view to prevent inflammation, the divided arteries should be allowed to discharge freely; especially if the patient is plethoric; and this being done, the surgeon should proceed to unite the sides of the fissure. In this he will be much assisted by desiring the cheeks to be pushed forward so as to bring the edges of the wound nearly into contact, although not altogether so close as to prevent him from seeing freely from one side of it to the other; the Assistant behind being desired to support the parts in this situation during the remaining steps of the operation.

The surgeon is now to see that the two sides of the cut correspond exactly with each other; and this being done, the pins intended to support them must be introduced in the manner I have mentioned in describing the twisted future, Chap. V. Sect. V. The first pin should be near to the under edge of the lip: If possible, indeed, it should be placed entirely within the red part of the lip, leaving no more space beneath than is merely necessary to support it. In adults, another pin should be inserted in the centre of the cut, and a third within a very little of the superior angle. By some we are advised to use a greater number of pins; but even in adults three are always sufficient, and in infants two will very commonly answer. In passing them, they should be made to enter nearly half an inch from the edge of the fore; and being carried nearly through the whole substance of the lip, which will be seen by retaining the wound open in the manner I have advised, they must be again passed outward, in a similar direction, and

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to an equal distance on the opposite side of the fissure.

The assistant should now push forward the cheeks, and having brought the edges of the sore close together, a firm waxed ligature should be applied over the pins in the manner I have formerly mentioned for the twisted future, as will perhaps be better understood by fig. 3. Plate XLIV. The ligature should first be applied to the under pin, and being made to pass two or three times round it, so as to describe the figure of 8, it should then be carried to the contiguous pin; and being in a similar manner carried round this pin, the operation is finished by carrying it to the other; care being taken in the whole course of applying it, to draw it of such a tightness as may retain the parts in contact; but not so strait as to irritate or inflame them, as is too frequently done.

By some we are desired to use a separate thread for every pin, in order, as they say, to admit of one pin being removed, if it should become necessary, without

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disturbing

disturbing the others. This, however, I have never found to be the case ; so that the precaution is unnecessary, while it deprives us of the advantage of passing the ligature diagonally from one pin to another, by which we have it in our power more effectually to prevent the sides of the fissure between the pins from rising into unequal heights than otherwise could be done.

A piece of lint covered with mucilage to retain it, should now be put over the cut, with a view to protect it more effectually from the air ; and it should likewise be made to cover the ends of the pins, to prevent them from being entangled with the bed-clothes, or otherwise ; and this is all the dressing or bandage that in general we ought to apply. We are desired indeed by many, after the pins are all secured with ligatures, to apply the uniting bandage, in order to support the muscles of the cheek, so as to prevent the pins from cutting or irritating the parts through which they pass, which they are apt to do,
when

when the deficiency of parts is considerable.

In the course of my experience, however, no benefit has ensued from this, while in some instances it does harm, for a bandage cannot be applied with such tightness as to give support to the muscles of the cheek without exciting pain in the parts newly divided; and it also proves hurtful, as I have elsewhere observed, by pressing upon the ends of the pins over which it must pass; for even although a slit is made in that part of the bandage which corresponds to the lip, as some have advised, pressure upon the pins can scarcely be avoided: And besides, although a bandage may be applied sufficiently tight at first, the motion of the jaw commonly loosens it soon, so as to prevent it from having any farther effect. When, however, the deficiency of parts is great, and the edges of the fore are with difficulty brought together, some advantage may be derived from a proper use of adhesive plasters. An oblong piece of leather, spread

either with common glue, or with strong mucilage, such as is employed in making court-plaster, being applied over each cheek, and of a size sufficient for reaching from the angle of each jaw, to within an inch or thereby of the pins, and each piece of leather having three firm ligatures fixed to that end of it next the pins, one at each corner and another in the middle, the cheeks should now be supported by an assistant, when the ligatures should be tied so as to retain the parts in this situation; and if care is taken to make the ligatures pass between the pins, and not immediately over them, little harm will be done them. It rarely happens, however, that this kind of assistance is needed; for I have, in almost every instance, found that the pins alone answer the purpose.

It is scarcely necessary to observe, that while the pins are in the lip, the patient should be fed upon spoon-meat, and be prevented from laughing, crying, and stretching his mouth in any manner of way.

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The pins having remained in the lip for five or six days at farthest, they should then be taken out; for I have found by experience, that the parts are by that time united; and by remaining longer, they are apt to leave marks which do not so readily disappear as when they are removed sooner. I have reason indeed to think, that three days would frequently prove sufficient; but as I know from experience that the pins may, without detriment, be allowed to remain for five or six, I think it better not to remove them sooner.

In order to illustrate what I have said, some figures are delineated in Plate XLIV. representing the appearance of a hare-lip before the operation,—the parts which ought to be removed,—the application of the pins,—and the appearance which the parts should have when the operation is finished. But for a more particular account of these, I must refer to the explanation of the Plate.

What I have hitherto said relates to the disease in its most ordinary form. In

the case of a double hare-lip, the operation requires to be performed twice in all its parts; first in one fissure, and then in the other; although by some we are advised to do them both at the same time: But this should never be attempted; for by doing so, we incur the risk of losing all the advantages to be derived from the intermediate sound parts, and of which I once met with a very distressful instance. The sound part of the lip lying between the two fissures, was by no means inconsiderable, but being much stretched with a great number of pins passed through it, it began to inflame immediately after the operation; and the inflammation and pain increasing, the whole pins were obliged to be removed, and the patient would not afterwards submit to any farther trial. We ought, therefore, first to complete the cure of one fissure; and this being done, we may in the space of a few weeks venture with much safety on the other.

In describing this operation, I have desired, that although the fissure may not extend

tend the whole breadth of the lip, yet that the cut should pass up to the upper part of it ; and any person accustomed to this operation, will know that the parts may be united much more neatly in this manner, than when the lip is only cut through part of its breadth. By one method of treatment, the parts, when drawn together, are smooth and equal ; but by the other, they are apt to be uneven, and much puckered.

I have also desired that the surgeon should take particular care to make the two sides of the cut exactly of an equal length ; a point of much importance in this operation, and requiring more attention than it commonly meets with : For it is obvious, if one side of the wound is longer than the other, that the cicatrix will not be smooth and even, as it ought to be : By inserting the first pin at the edge of the lip, this part of it will indeed be properly united, but the rest of it must be uneven. The most effectual preventative of this, is to mark with small dots of ink, not

only the length of the cut on each side, but the direction that it ought to take, by which every chance of going wrong is guarded against.

It is of much importance to have the lip equally and tightly stretched in making the incision, otherwise the edges of the sore will be ragged and uneven: This, with proper attention, may be always done; but with a view to guard against it as much as possible, curved forceps may be employed for laying hold of the lip. Different forms of these are delineated in Plate XLII. fig. 2. and 3. They should be made so as to compress the lip equally; and being applied in the direction intended for the incision, the scalpel is carried along the side of them, by which the cut may be made very exact and even. Other forms of this instrument have been proposed; but those that I have delineated are more simple, and answer the purpose better than any that I have met with.

By some we are desired not to employ any instrument of this kind, under an apprehension

prehenſion of its irritating and bruifing the lip. This ſuſpicion, however, can have occurred only to thoſe by whom it has never been uſed; for when the blades are ſmooth and equal, a degree of compreſſion may be made with it perfectly ſufficient for fixing the lip without creating pain, which I can aſſert from much experience of its utility.

Instead of making the incision in this manner, ſome deſire it to be done by fitting a piece of paſteboard, lead, or tin, to the gums beneath; and the lip being placed on it, it is divided by cutting down on it with a ſcalpel to the ſupporting ſubſtance: The operation may no doubt be done in this manner, but the cut is more eaſily made in the manner I have adviſed.

Till of late, the incision in this operation was commonly made with ſciſſars; and although they are now very generally laid aſide on the ſuppoſition of their bruifing the lip, yet I know that the operation may be very properly done with them. Scifſars ſhould not be employed to cut a
part

part of much thickness, but the lip is seldom so thick as to render it improper to use them in this operation. They have of late been used in this place by different practitioners; and as the point can be determined by experience only, I have likewise employed them. In order to ascertain which of the two modes of operating, that with the scalpel or scissars, should be preferred, I have in different cases made the incision on one side with a scalpel, and on the other with scissars. The patients commonly say that the scissars give least pain, probably from their making the cut in less time than can be done with the knife; and, during the cure, that side of the lip on which the cut is made with scissars, neither swells nor inflames more than the other. I do not from this, however, mean to say, that scissars are preferable to the scalpel; I mention it only to shew that the common idea entertained of the effect of scissars is ill-founded, and that the operation may be equally well done with both instruments. Scissars for this purpose should
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be very strong, and particularly firm at the joint. They should also be highly polished. The size and form of them represented in Plate XLIII. fig. 1. has been frequently used, and is found to answer.

When describing the Twisted Suture in Chapter VI., I gave the preference to gold pins; and I am clearly of opinion that they are the best. When of a proper form, such as are represented in Plate IV. figs. 2. 3. and 4. they pierce the lip with much ease, without any assistance from a porte-aiguille: But those who think that a sharper and firmer point than can be given to gold will answer better, may have steel-points added, as is represented in figures 6. 7. and 8. of the same Plate; and the steel-points being moveable, they may be removed after the pins are passed, by which every risk is avoided of wounding the contiguous parts. By some practitioners, flexible needles are employed for this operation; but they do not answer so well as those that are firm, and give sufficient resistance to the ligatures.

In passing the needles, I have said that they should go nearly through to the opposite side of the lip: This merits particular attention, otherwise a fissure is apt to remain in the inner part of the lip, from which a good deal of trouble may be experienced. And besides, although the discharge of blood that succeeds to this operation is always stopt immediately on the parts being drawn together by the ligatures if the pins have been properly introduced, yet when not passed to a sufficient depth, the blood will continue to get out behind, and may afterwards be productive of much distress. I have seen an instance of this, where a very troublesome oozing of blood continued for several days after the operation; and an instance is recorded even of death having ensued from it. In order to prevent the lip from being stretched by the patient in spitting, it is the usual practice to desire him to swallow his saliva with the blood that may be discharged from the fore. In this case the patient complied implicitly with the directions

tions given him ; and he having died from the cause I have mentioned, namely, a great loss of blood, his stomach and bowels were found filled with blood that he had swallowed *.

I have thus described all the steps of the operation for the hare-lip ; and it is proper to observe, that they are equally applicable in the treatment of a fissure in the lip by whatever cause it may be formed ; only, in a recent cut, as the edges of it are already raw, all that the surgeon has to do is to insert the pins and apply the ligatures. In wounds where suppuration has already commenced, there is usually some degree of inflammation upon their edges. While this continues, it would be improper to draw them together by ligatures ; but as soon as the inflammation subsides, we may with sufficient propriety insert the pins and finish the operation in the manner I have advised. We are told indeed by many, that this practice will succeed

* Vide Mémoires de l'Académie Royale de Chirurgie, Tom. iv. p. 427.

ceed only in recent wounds, and that it should not be recommended where matter is already formed : I have often, however, acted otherwise, and where the edges of a fore have not become callous, they have never failed to unite with equal ease when covered with pus, as when perfectly recent, and covered with blood.

In cases of hare-lip accompanied with fissure in the bones of the palate, after uniting the soft parts in the manner I have pointed out, some advantage may be derived from a thin plate of gold or silver exactly fitted to the arch of the palate, being fixed by a piece of sponge stitched to the convex side of it, and inserted into the fissure. If the sponge is properly fitted and inserted dry, the moisture which it imbibes from the contiguous parts will for the most part make it remain sufficiently firm, by which both speech and deglutition will be rendered more easy. In some cases, however, the form of the fissure is such as to prevent the sponge from having any effect. This always happens

opens when the opening is widest outwardly. For such cases other means have been proposed, especially thin plates with gold springs, made so as to fix upon the contiguous parts ; but no invention of this kind has been yet found to succeed.

SECTION II.

Of the Extirpation of Cancerous Lips.

THE under lip is more frequently attacked with cancer than any other part of the body ; and as we know of no internal remedy by which the disease can be cured, the only means we employ for it is the removal of the diseased parts. When treating of cancerous ulcers, in the fifth Chapter of this work, I endeavoured to shew, that little dependence can be placed on arsenic or any other of the caustic applications, that have been so much recommended for this purpose ; and that we are to trust to the scalpel alone for relief.

When a cancerous sore has spread over any considerable part of the lip, and especially when the lip is altogether diseased, all that a surgeon can do is to remove the diseased

healed parts ; to secure the divided arteries with ligatures, when this is found necessary ; and to dress the fore as a recent wound. In this manner a cancer may effectually be taken away ; but it gives a very disagreeable appearance, from the lower teeth and gums being left uncovered ; while the patient can neither retain saliva, nor swallow liquids easily. There is here, however, no alternative ; where the whole lip is taken away, these inconveniencies must necessarily ensue, as there is no possibility of drawing the divided parts together.

But when the disease has not attacked a considerable part of the lip, we may always have it in our power to draw the edges of the cut together, so as to make them unite with the twisted suture in the manner described in the last section ; by which we not only prevent deformity, but the patient is equally capable as before the operation, of swallowing liquids and retaining his saliva : And besides, this method of treatment, as I have elsewhere re-

marked, by leaving a small extent of cicatrix, seems to have some effect in preventing a return of the disease ; at least this has been evidently the case with those that have fallen under my observation. Where the operation has been performed in the usual way, without drawing the divided parts together and uniting them with ligatures, the disease has in several instances returned : But, excepting in a very few unfavourable cases, it has never returned where the hare-lip method of treatment has been employed. Nay more, this will sometimes succeed where the other has failed. A man appeared at our Infirmary here with a cancer on the under lip. It had been twice removed by extirpation in the usual way ; but the disease returned after each operation almost as soon as the sore was healed : The lip being sufficiently full, the hare-lip method of treatment was next put in practice ; the cure was accomplished ; and I had an opportunity of knowing, eight years after the operation, that the man remained in
good

good health, without any return of his disease. Nor should we be deterred from doing the operation in this manner, by the disease being extensive, if we find that the parts that have been divided can be drawn together and retained by the twisted suture: And this, I may remark, may be always done where the disease does not render it necessary to remove almost the whole lip. The parts, forming the lip, stretch so considerably, that in general this method of treatment may be advised, although only a third part of the lip may remain.

With respect to the method of doing the operation, I must refer to the last section. In addition to which, I have to observe, that all the cancerous parts ought in the first place to be removed, taking care to form the cut in such a manner as will most readily admit of the divided parts being easily and neatly drawn together. When the disease is seated in the lip only, the parts will have nearly the same appearance after this operation, as

after that for the hare-lip. But when the cancer extends to the cheek, as is sometimes the case, a longitudinal division of the lip will not only be needed, but also a transverse cut into the cheek; both to be united by pins and ligatures: An operation which, in different instances, I have put in practice with very complete success.

CHAPTER XIV.

Of the DISEASES of the MOUTH.

SECTION I.

Anatomical Remarks.

BEFORE proceeding to consider the diseases that are the object of the present chapter, it may be proper to premise a short anatomical description of the teeth, gums, and jaws, the parts in which these diseases are chiefly seated.

On examining a tooth, we find it divided into three parts;—that part of it which lies above the gums, termed the Body or Corona of the tooth;—the roots or fangs, which the gums, in a state of health, cover entirely;—and a kind of depression between the body and fangs, just where the gums commonly terminate, which we term the Neck of the Tooth.

The root, as well as the interior part of the corona, is composed of osseous matter; but it appears to differ from bone by our not being able to throw injections into it: For although we are told that this may be done, there is much reason to imagine that the opinion is ill-founded, from the best anatomists having failed in it*.

This osseous part of the teeth being of a soft texture, would soon suffer and wear away by mastication: But nature has amply provided against this inconvenience; for we find all that part of them lying
above

* Vide the Natural History of the Human Teeth, by John Hunter, 2d edition, p. 36, &c.

above the gums, covered with a firm, hard substance, termed the Enamel. This part of a tooth, besides being much harder than bone, differs from bone in our not being able to pass the most subtile injection into it ; nor can it be tinged by feeding an animal upon madder, or any other colouring substance, as is the case with every bone in the body. The enamel is thickest on the upper surface of the teeth, especially in the grinders, where it is most needed ; and it becomes gradually thinner as it approaches the neck, where it terminates. At this part we first find the periosteum, which, besides covering all the roots of the teeth, is intimately connected with them, as well as with the surrounding sockets.

In the interior part of every tooth we discover a hollow, or cavity, corresponding to the size and figure of the tooth itself. It commences by a small opening in the extremity of the root or fang, at which the bloodvessels and nerves of the tooth enter ; and this canal becoming wider

der as it proceeds forwards, terminates at last in the body of the tooth, where the cavity is filled with a pulpy kind of substance, probably formed by an expansion of the bloodvessels and nerves that belong to it. A tooth with one root or fang has commonly only one hole or opening; but some teeth have several fangs, and every fang not only has a canal passing through it, but is supplied with distinct bloodvessels, and probably with separate branches of nerves, although these have never been clearly traced into them.

The teeth are fixed in what is termed the Alveolar Process of each jaw. This consists of a broad thick edge, with which the jaws are furnished, divided into separate cells or openings for the fangs of the teeth; and the roots of the posterior teeth being larger and more expanded than the others, we find accordingly that this part of the jaw is thicker and broader than the fore-part of it. In the upper jaw, this difference with respect to thickness, is increased by the antrum Highmorianum,

a large cavity in each maxillary bone, immediately above the large molares or grinders of each side. This sinus has no communication with the mouth, but it opens into the nostril between the two ossa spongiosa, by a canal which in the skeleton is large enough to admit a common quill. The alveolar process of the upper jaw is divided from this cavity by a thin plate of bone, in which the roots of the posterior molares commonly terminate; but in some subjects they pass through this plate into the antrum itself.

The lower jaw is in infancy composed of two bones, united at the chin by what is termed the Symphysis of the jaw. These bones, however, are soon joined so firmly together, that they have the appearance of one continued and connected piece. Besides the alveolar process, the under jaw is on each side furnished with other two processes, with which it is necessary for practitioners to be acquainted. The anterior, which seems to be chiefly intended for the insertion of the temporal muscle,

cle, is termed the Coronoid Process. It arises in the form of a ridge from the outside of the jaw opposite to the two posterior molares; and proceeding backward and upward, it terminates in a thin sharp point: And the posterior, or Condylod Process, which is shorter, thicker, and stronger than the other, terminates in an oblong head or condyle, by which the articulation is formed between this bone and the head.

The coronoid process gives a degree of strength and thickness to the external plate of the alveolar process in this part of the jaw, that does not take place in any other part of it. This renders it improper to extract the two last molares by turning them outwards. They should always be pulled towards the inside of the mouth. Through all the rest of the jaw, the sockets or alveolar processes are weakest on the outside, although the difference is inconsiderable; and they are in both sides weaker in the upper than in the under jaw.

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The full number of teeth in an adult is thirty-two ; and being of different forms, and intended for different purposes, they are accordingly distinguished by particular names. The four anterior teeth in each jaw are named Incisores ; the next to these on each side are the Canine ; and the five posterior teeth on each side are termed the Molares or Grinders ; the two first the Small molares, and the other three the Large molares or grinders.

In childhood there are only twenty or twenty-four teeth, which continue till the sixth or seventh year, when they begin to drop, and are succeeded by others, termed the Adult or Permanent Teeth. The first set, or Milk Teeth as they are commonly called, as well as some of the others, are formed in the jaw before birth ; but they do not in general appear above the gums till the child is several months old. In some instances, about the fourth or fifth month, but most frequently about the eighth or ninth, two of the incisores

fores appear in the lower jaw. These are commonly succeeded by two in the upper jaw, and the other four fore-teeth appear afterwards, at uncertain periods, between this and the tenth or twelfth month. About the sixteenth or seventeenth month, four of the large molares appear; for in childhood there are no small molares: One of these push out on each side, leaving a space between them and the incisores for the canine teeth; which being formed farther up in the jaw, seldom appear before the twentieth month: But about this period, or between this and the end of the second year, they and other four molares commonly make their appearance.

These are the periods at which the infantine set of teeth usually appear; but much variety is met with in this. I have known the canine teeth appear before any of the molares. In one instance, they came forward before two of the incisores. In some cases the incisores have been observed

served in the second and third months, nay, even at birth; whilst in others, I have known the fourteenth or fifteenth month pass over before any have appeared.

These teeth continue firm till the fifth or sixth year. About this period they begin to loosen; and between the seventh and twelfth year they are commonly all shed and succeeded by others. By this period, too, the jaws are somewhat lengthened, so as to admit of other four molares. Between the twelfth and sixteenth years four others appear; and about the eighteenth, nineteenth, or the twentieth year, the four last of the molares appear, usually named the *Dentes Sapiientiæ*.

The two sets of teeth have very different appearances, insomuch that we may in general know, from the appearance of a tooth, whether it belongs to the infantine or permanent set; and as this is often a point of importance, practitioners ought all to be able to judge of it; particularly
in

Diseases of the Mouth. Chap. XIV.

in the treatment of those diseases of the teeth that occur about the time of shedding the first set; for it frequently happens that we would have no hesitation in pulling a tooth, were we certain that it belonged to the first set; while we would rather allow it to remain, if it appeared to be one of those that would continue during life. It has happened, indeed, in a few instances, that a third set of teeth have appeared; but this is such a rare occurrence, that it can only be considered as a very unusual deviation of nature.

The sockets of the teeth, and a small portion of the teeth themselves, are covered with a red, firm, fleshy kind of substance, termed the Gums. This substance seems to be almost entirely vascular; for the slightest wound or scratch in it is always attended with a discharge of blood. The alveolar process of each jaw is entirely covered with it; so that there is a small portion of gums between every two teeth.

In

In some diseases, particularly in the scurvy, a partial separation of the gums from the teeth often takes place; but in a healthy state they adhere so firmly to the necks of the teeth as to have some effect in fixing them in their sockets.

We shall now proceed to treat of the diseases of these parts, and of the operations performed upon them.

SECTION II.

Of Dentition.

DURING the approach of the first set of teeth, and in some instances of that of the second, much distress is apt to arise from the irritation which they excite in the gums. For this reason I have thought it right, before proceeding to the diseases of the mouth, to offer a few general observations on Dentition.

In dentition, the gums inflame and become full about the part where the teeth are afterwards to appear. The child is constantly rubbing them with his fingers. The saliva is for the most part increased in quantity ; but in a few instances it is otherwise, and the mouth becomes perfectly dry. The bowels are commonly very irregular, so that we seldom meet with a
medium

medium between obstinate costiveness and severe degrees of purging: The heat of the body is increased, and quickness of pulse takes place, along with other symptoms of fever. These are the most frequent symptoms of dentition; but it often happens that *subcitus tendinum*, and even convulsions supervene.

As these symptoms all arise from irritation, those means are chiefly to be trusted that prove most effectual in counteracting this. Hence we derive much advantage from opiates, blisters, and especially from warm bathing. But when these fail, which they often do, we have it frequently in our power to remove every symptom, by making an incision through the gums directly upon the approaching tooth or teeth; an operation usually termed Scarification of the gums.

A common prejudice prevails against this operation, from an idea of its doing harm in the event of a cicatrix being left upon the gums; which sometimes happens when the tooth is not just at hand; for it

is supposed that the cicatrix will afterwards be worse to penetrate than if the gum had not been touched. For this reason, the operation is seldom or never advised till the tooth is observed to have elevated the gum: But in this we are wrong; for when delayed so long, almost all the advantages that might be derived from it are lost. I have commonly observed, that the very worst symptoms of dentition take place, before the teeth have come this length; and that they usually abate on the teeth approaching towards the surface of the gums, probably from their being rendered more insensible by the long-continued pressure of the teeth beneath.

Whenever there is cause, therefore, from the symptoms, to suspect that they are owing to this cause, we should without hesitation make a free incision through that part of the gums where the tooth appears to approach; and if this incision should afterwards heal, and if the symptoms should again supervene, no risk could occur from the operation being repeated. I

have

have frequently found it necessary to cut two or three times upon the same tooth; but with a view to prevent the necessity of this, I commonly make a crucial incision down to the depth of the tooth, and I have never found it to do harm. We need never be afraid of hemorrhagy. Indeed the cut seldom bleeds above a few drops, and it commonly heals easily.

The operation may be done with a common lancet; or with a bistoury or scalpel; the instruments usually employed for it: But it cannot be neatly done with any of these; and besides, we are in danger, either with a lancet or scalpel, of hurting the contiguous parts. The instrument represented in Plate XXXVI. fig. 4. is not liable to any of these objections; and being of a small size, it may be entirely concealed in the palm of the hand. The child being secured by the nurse, the surgeon with the fingers of one hand should open the mouth; and conducting the edge of the instrument with the fore-finger of the other, the incisions should be finished

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When it is withdrawn, care being taken to make a crucial cut over every tooth that appears to be approaching. The incision, as I have already advised, should always be carried to the depth of the tooth, so as to lay it entirely bare; and when this is fully done, the effects that result from it are often remarkable. I have seen instances of children being instantly relieved by it, who previously appeared to be in the most imminent danger.

It sometimes happens, too, as I have already observed, that disagreeable symptoms take place from the approach of the second set of teeth. I have known pain produced over the whole jaw, attended with swelling and inflammation of the gums, cheeks, and contiguous parts, from a single tooth not getting freely out. This happens most frequently with the dentes sapientiæ; in some instances, from the irritation that they produce upon the gums, which in the back-part of the jaws are very thick; but in others from their not being room in the jaw to admit them. In the

the first case, we have it commonly in our power to remove all the symptoms, by making a free incision directly upon the tooth; but in the other this does not always prove sufficient, and nothing will frequently answer but extraction of the tooth. When the symptoms are found to proceed from this cause, we should not hesitate in removing the tooth: For it seldom happens that any advantage is gained from delaying it, while the inflammation induced upon the gums often spreads to the throat and contiguous parts; and is thus productive of much distress, which might be easily prevented. When the throat inflames and swells, no other remedy will answer, while the most violent degree of inflammation will be removed in the course of a short time, by the removal of the tooth. This I have known where the symptoms had obstinately resisted every other means for a great length of time.

SECTION III.

Of the Derangement of the TEETH.

THE second set of teeth frequently appear in a very irregular manner: Some of them will be very properly placed, while some are farther out, and others farther in, than they ought to be. When the derangement is not very remarkable, it seldom meets with much attention; but it often happens, that the deformity is so considerable, that artists are applied to for removing it. It happens most frequently with the incisores and canine teeth, seldom with any of the molares.

Derangements of the teeth may take place from different causes:—From a deficiency of space in the jaw, by which they cannot be all admitted in the same line;—from a natural mal-conformation;

—or

or from some of the first set remaining in after the second set have appeared.

We often find, that teeth that are out of the line will fall into it without any force being applied to them, on space being given them by one or more of those in the line being pulled. When it appears, therefore, that the derangement proceeds from any of the first set not having dropped, they ought to be removed ; for the longer this is delayed, there will be the less chance of the irregular teeth falling into their situation : But when it even proceeds from those of the second set being too large for the space they are to fill, we should not hesitate in removing some of them, for no other method will answer. When the teeth which occupy the natural circle of the jaw are regular, and have a good appearance, the tooth or teeth that are out of the circle ought to be pulled ; but when either of the contiguous teeth do not fill the place so properly as these would do, or when they are rough, or otherwise of a disagreeable appearance, it is

is sometimes advisable to remove one of these that are in the circle, while at the same time we endeavour to bring the others into it. If this is done before the teeth have been long fixed, and if they are not far distant, they will sometimes in a gradual manner, as I have already observed, fall into the vacancy without any assistance; but when this does not happen soon by an effort of nature alone, we may frequently employ means for promoting it. No attempt, however, of this kind can be made till the body of the deranged tooth has passed freely out from the gums, as till then we cannot with ease lay hold of it.

The usual method of moving teeth that are out of the range, is to apply a ligature round them, and pulling it tighter from time to time, to fix each end of it firmly to the contiguous teeth: Or a plate of gold or silver is fitted to the contiguous teeth, and made to surround the deranged teeth in such a manner, that when firmly pressed down by the opposite jaw, it acts with
considerable

considerable force in bringing the teeth nearer together. This last method, however, proves troublesome to the patient; and the other, while it in some degree moves the deranged teeth towards the circle, serves nearly in the same degree to draw the others out of it: but we may in a different manner apply a ligature for this purpose with safety, and it is the best that I have seen for the purpose. Let a thin plate of gold, of a length sufficient to pass over four of the contiguous teeth, be exactly fitted to the outside of the two teeth on each side of the vacancy into which the deranged tooth is to be moved. The plate should be perforated with several small holes: On being applied to the teeth, and fixed to them with a bit of waxed thread, let a piece of flexible wire be passed through two of the holes; and the doubling of the ligature being carried over the tooth to be moved, the two ends of it should be firmly drawn through the holes, and fixed with pliers. Every two or three days the ligature should be made tighter; and

and this being continued, almost every tooth in this situation may at last be brought into the circle.

It sometimes happens that much deformity is produced by an opening in the anterior part of the jaw, formed either by one or more teeth being accidentally driven out, or from there being a natural want of them. When a surgeon is called immediately on a tooth being driven out, he should instantly replace it; or if the tooth is broken, or otherwise much injured, he may consult the inclination of the patient with respect to the transplanting of a sound one from the mouth of another person. But patients seldom complain till the injured parts have become inflamed and tumefied, when it is too late to put this method of treatment in practice. In this situation we must wait till the pain and swelling are removed; when, if more than one tooth is wanting, the deficiency must be supplied with artificial teeth fixed to those which remain firm; but when one tooth only is wanting, we
may

may frequently, in young people, be able to remove the deformity, by passing a ligature round the two contiguous teeth, so as by degrees to draw them nearer together. Nature will frequently accomplish this, in some degree, of herself: But the operation is commonly slow; and besides, it is seldom done so completely as when ligatures are employed. By this means the bodies of the teeth are equally drawn together; but when ligatures are not used, although the teeth, from want of support, will fall nearly together at their points, the opening will commonly remain nearly the same at their roots.

SECTION IV.

Of GUM BOILS.

THE gums, like all the soft parts of the body, are liable to abscesses ; but they are more frequent here than in other parts, from the gums being more exposed to causes that tend to produce them. Abscesses may in this situation proceed from cold and from external violence, as well as from every cause that tends to produce inflammation in other parts ; but for the most part we may trace them as the consequences of toothach : And they arise not only from carious teeth, but from inflammation at the roots of teeth, when perhaps in every other respect the teeth are perfectly sound.

A gum-boil commonly appears after a fit of toothach has continued for some time.

time. It begins with some degree of pain, attended with a small tumor on the part affected. By degrees the cheek swells; and this swelling frequently spreads over the whole face, so as to produce much deformity. On suppuration taking place, the small tumor, which is commonly seated on the outside of the gums, exactly opposite to the diseased tooth, begins to point; and if it be not opened, it generally bursts either through an opening in the side of the gum, or between the gum and the tooth. A quantity of matter is now commonly discharged, by which the patient is in general completely relieved. But as the cause still remains, the discharge likewise continues; for the disease being most frequently induced by some affection of a tooth, or by a portion of the jaw becoming carious, a discharge of matter usually continues, either till the tooth is removed, or till the carious part of the jaw has exfoliated: Or, if the opening happens to close, the disease is quickly renewed; the swelling returns, and again goes through all the

stages of inflammation and suppuration in the manner I have just described. When, indeed, the disease proceeds merely from inflammation at the root of a tooth, and when the root happens not to be denuded of its periosteum, after the matter of the abscess is discharged, the sides of it may collapse and adhere, and a cure will in this manner take place : But when it arises either from a carious tooth, or from a carious portion of the jaw, or even when it proceeds from inflammation alone, if the root is laid bare by the matter, the disease will recur from time to time, till the tooth or carious part of the jaw is removed ; for these will continue to irritate the contiguous parts in the same manner with extraneous bodies of any other kind. In the case of a spoiled tooth, we should advise it to be immediately removed ; but when the disease proceeds altogether from inflammation at the root of a tooth, before pulling it every method of a more simple nature should be tried ; and the same means that we employ for the cure of abscesses
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In other parts, should be put in practice here. When a free opening is formed by the bursting of the abscess, we may sometimes be able to dry up the running, by injecting from time to time lime-water,—ardent spirits,—tincture of myrrh,—or tincture of Peruvian bark properly diluted. But although trials of this kind may be advisable with timid patients, who will not submit to other means, we can seldom place much dependence upon them: Our surest practice is to lay the abscess open by an incision from one end to the other, and to endeavour to heal it from the bottom, by inserting a small dossil of lint between the edges of the cut, with a view to open them, till a sufficiency of granulations form beneath. This is the surest method of obliterating the imposthume; and when any part of the socket is carious, it will in this manner more readily exfoliate than it would do were it still covered with the gums.

I have hitherto been supposing that the matter has been collected in the substance

of the gums, or between the gums and the tooth, or perhaps that it surrounds the socket of the tooth; but abscesses in these parts are often more deeply seated, when they not only create more immediate pain and distress, but more subsequent risk: For when the more solid parts of the jaw become carious, which they commonly do when the matter of imposthumes gets into contact with them, the cure not only proves tedious, but external marks of a disagreeable kind are apt to ensue from them. With a view to obviate this, the usual practice of applying warm poultices should be avoided; we should rather, by warm fomentations taken into the mouth, and by the application of any warm stimulating substance, such as a roasted onion, to that part of the gum which appears to be most affected, endeavour to promote the formation of any abscess that may point into mouth; and as soon as matter appears to be formed in it, it ought to be opened without waiting till complete suppuration has taken place.

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In the after-treatment of the abscess, all that we can do is to preserve a free depending orifice for the discharge of the matter, by which any farther mischief will be prevented, and by which alone we can reasonably expect a cure; for even where the disease is connected with a carious state of the jaw, giving a free vent to the matter is perhaps all that art ought to attempt. If the constitution is otherwise sound, this, together with the removal of any of the contiguous teeth that are diseased, and of such parts of the jaw as are carious, and separate from the rest, will ultimately effect a cure, if this by any means can be done. But in diseased habits of body, especially in scrofulous constitutions, this kind of tumor is always of difficult management, and can seldom indeed be healed till the general disease of the system is removed.

abscesses in the antrum maxillare
 with a swelling of the face
 and the eye.

SECTION V.

Of Abscesses in the Antrum Maxillare.

Of Abscesses in the Antrum Maxillare.

Of Abscesses in the Antrum Maxillare.

Of Abscesses in the Antrum Maxillare.

MATTER may collect in the antrum maxillare from various causes: Whatever tends to induce inflammation on the lining membrane of this cavity may produce them. Hence they may be induced by blows and other injuries done to the cheeks. Inflammatory affections of the membrane of the nose, and even long-continued inflammation of the eyes, by spreading to the contiguous membrane of the antrum, have often an influence in producing collections of this kind; and much exposure to cold has frequently been traced as the cause of them. But their most frequent origin is pain and irritation excited in the jaw by repeated and violent returns of toothach.

From

From this account of the cause, the nature of the symptoms will be readily understood. Indeed, if we make allowance for the nature of the parts in which these collections are seated, the symptoms will be found to be nearly such as take place from inflammation and abscesses in other parts of the body. At first some degree of pain is felt over the cheek, and this commonly continues for a considerable time before any external swelling is perceived. On a farther continuance of the disease this pain becomes more severe, and in some instances spreads to the neighbouring parts, so as to create uneasiness in the eye, nose, and ear ; and at last an extensive hard swelling appears over the whole cheek, which sooner or later points at a particular place, most frequently in the centre of the cheek, a little above the roots of the posterior molares. In some instances, indeed, the matter bursts out between the roots of these teeth and the gums, by which the external tumor upon the cheek is prevented from pointing.

This, however, does not commonly happen; and it only takes place, I imagine, when the roots of the teeth penetrate the antrum, by passing through the palate at the bottom of the socket. For the most part, too, as soon as matter is fully formed in the antrum, we find some of it discharged by the corresponding nostril when the patient lies upon the opposite side with his head low; and if this frequently happens, it prevents the external swelling for a considerable time from pointing at any particular place, and consequently from bursting, which it would always do if the matter was not discharged in some other manner.

This discharge of matter by the duct leading from the antrum to the nose, does not, indeed, take place in every instance; but as I have met with it in several cases, I am not inclined with Mr Hunter to consider the obliteration of this duct as a frequent cause of these collections *: Indeed

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* See a Practical Treatise on the Diseases of the Teeth, &c. by John Hunter, F. R. S. &c. p. 44.

I doubt if it is ever the cause of them. For the most part, they may be traced as the effect of one or other of the causes that I have mentioned; particularly of toothach, or of inflammation excited by cold, or in some other manner. When obstructions, therefore, happen in this duct, they are rather to be considered as a consequence of the disease: More frequently, perhaps, as the effect of the adhesive stage of inflammation, than as the cause of the collection.

A discharge of matter from one of the nostrils, when it succeeds to pain and inflammation of the cheek, will for the most part be found to proceed from an abscess in the corresponding antrum maxillare; but we ought to remember that matter may be discharged from the nostrils from other causes; particularly from an inflamed state of the membrana Schneideriana; from an ozena; from affections of the frontal sinuses; and from abscesses in the lachrymal sac. In forming our opinion, therefore, every circumstance

connected with the discharge, should be taken into consideration, otherwise much disappointment may ensue from our treating one disease for another.

In the treatment of abscesses of the antrum maxillare, nothing will accomplish a cure but our giving a free discharge to the matter: Collections of matter, indeed, in this situation, should be considered in the same light with affections of a similar nature in whatever part of the body they may be: Wherever matter is discovered, it ought to be discharged; and in no instance is attention to this more necessary than in abscesses of the antrum maxillare: For if the matter be not discharged, it will distend and elevate the bones of the cheek, and at last render them carious.

With a view to prevent this distressful occurrence, an opening should be made into the antrum as soon as we are convinced, from the nature of the symptoms, that it contains matter. It may be perforated in two different parts. In that part of it which projects outwardly over
the

the two great molares; or one of these teeth may be taken out, and an opening made into the antrum, by perforating directly upwards in the course of one of the fangs. As most people wish to avoid the pulling of a teeth when not entirely necessary, the perforation is commonly made above the roots of the teeth. This lenity, however, proves often hurtful; for in this manner the perforation must be made in the side of the antrum, by which a depending opening cannot be given to the matter; nor can it be obtained in any other way than by making a perforation in the manner I have mentioned in the direction of one of the roots of the teeth.

I have already observed, that either of the two large molares may be drawn in order to admit of this perforation. When either of them is spoiled, the diseased tooth should be taken out; for being carious, there will be cause to suspect that it may have some share in the formation of the disease: But when this is not the case, we should remove the second great molaris,

molaris, or that tooth which lies next to the *dens sapientiæ*; for although the tooth immediately anterior to this is somewhat more accessible, the difference in this respect is inconsiderable; and the plate of bone that separates the antrum from the roots of the teeth being thinner in the back part of the jaw than in the anterior part of it, the perforation is accordingly more easily made in it.

On removing one of these teeth, matter in some instances is immediately discharged from the antrum; owing either to the roots of the teeth having been so long as to pass into this cavity; or, to the matter having corroded the bone that separates the roots of the teeth from the antrum: In this case, if the opening is sufficient for giving a free vent to the matter, the operation will thus be finished; but as it is easily enlarged, it ought always to be done where there is cause to doubt that the matter will not be discharged with freedom; and, when no discharge of matter takes place on pulling the tooth, an opening must

must be made into the antrum in the manner I have already advised, by pushing a sharp instrument into it in the direction of one of the fangs. A common trocar is usually employed for this, and in general the operation may be sufficiently well done with it; but the curved instrument represented in Plate XXV. fig. 2. answers better. In making the perforation, the patient should be seated on the floor opposite to a clear light, with his head laid back upon the knee of the operator, who may either stand or sit behind him. The instrument should be withdrawn as soon as it has entered the antrum, which is easily known by the resistance being removed from the point of it. The matter will now flow out freely; and as soon as it is all discharged, a small wooden plug, exactly the size of the trocar, should be introduced into the opening, with a view to prevent, not only the air, but the food in mastication, from getting into the antrum; and when the plug is properly fitted to the opening, it will remain sufficiently firm,
while

while at the same time there is no risk of its slipping in, if formed with a knob or head somewhat larger than the opening.

This plug should be removed from time to time, perhaps twice or thrice in the course of a day; by which all the matter will be quickly discharged; and no more being allowed to collect, the disposition to form it will in general be soon removed, and a cure obtained. But in some instances, either from much relaxation of the lining membrane of the antrum, or from a tendency in that membrane to inflame, the discharge of matter does not diminish, but continues nearly the same both in quantity and consistence long after the operation. In this case we may often forward the cure by throwing liquids of a moderate degree of astringency from time to time into the antrum. A decoction of bark is commonly employed for this purpose; but nothing should be used that contains the least particle of solid matter, as there is always some risk, when liquids not properly filtered are injected, of deposi-
tions

tions being left in the antrum; and in different instances I have seen mischief ensue from this. I commonly employ a solution of alum, or saccharum saturni, brandy properly diluted, or lime-water.

When the contiguous bones are sound, a cure will at last be accomplished by a continuation of these means; but when any of these bones are carious, it will be in vain to expect a cure till the diseased portion either exfoliates, or dissolves and comes away in the matter. By the introduction of a probe, we may always know whether the bones of the antrum are carious or not; but in general we may rest our judgment on this point on the smell and appearance of the discharge. When the bones are carious, the matter is always thin and fetid, and it becomes thicker and less offensive as this state of the bone diminishes.

I have hitherto been supposing that the antrum is perforated for the purpose of giving a discharge to matter; but the same operation becomes necessary for the removal

removal of other causes. I once met with an instance of a violent blow on the cheek ending in a large collection of blood in this cavity; and worms that form in it can only be removed by this operation. In what manner worms are produced in this situation, is difficult to determine; but whenever their presence is indicated, by severe pains in the region of the antrum, not induced by toothach or any other obvious cause, there can be no risk in making an opening for extracting them; but in this case there is no necessity for removing any of the teeth. A perforation made into the antrum, immediately above the roots of the large molares, will answer the purpose sufficiently. We should not, however, rest satisfied merely with extracting such worms as appear at the opening: We should inject from time to time such liquids into the antrum as will most probably destroy any that may remain; particularly oil, a filtrated solution of asafoetida, and perhaps a weak infusion of tobacco: And the perforation should be kept

kept open for a considerable time, to prevent as much as possible the risk of any worms being left.

I have mentioned the only two parts in which I think the antrum can with propriety be opened; namely, in the direction of the roots of the two large molares of the upper jaw; and immediately above the roots of those teeth on the outside of the jaw. I think it right, however, to observe, that it has been said that a perforation may also be made into the antrum from the nostril. None will doubt of this being practicable; but we might with perhaps equal propriety, say, that an opening may be made into it by entering the instrument from the roof of the mouth. It is evident, however, that it would not be so proper to perforate the antrum in either of these parts as in those that I have mentioned; and therefore I would not have judged it necessary to notice them here, were it not with a view to give my opinion of this method of making an opening from the nostril; which being proposed by

very respectable authority, I think it right that the younger part of the profession, for whom this is chiefly intended, should know that there is much cause to doubt of the propriety of the advice *.

By pursuing the means that I have pointed out, all such symptoms as arise from collections in the antrum maxillare may be removed : But the antrum is liable to swellings of a more hazardous nature, and which frequently do not terminate but in the death of the patient. The tumors to which I allude seem to proceed from an enlargement of the bones of the cheek. No matter is found in the antrum ; and therefore no advantage is derived from our making an opening into it. I have in different instances, indeed, observed much mischief ensue from it : For those who are not accustomed with this branch of practice, are apt to be misled by the state and appearance of the swellings ;
and

* Vide the Natural History of the Human Teeth, Part II. p. 46. first edition. By John Hunter, F. R. S. &c.

and suspecting that they contain matter, they very commonly make perforations into them, which frequently aggravate all the symptoms by occasioning a more rapid increase of the disease. We should therefore attentively distinguish between swellings of this kind and real collections of matter in the antrum. In the latter, the cheek seldom swells to any great extent; and when the disease is of long duration, if the matter does not find an opening into the nostril, or along the roots of the teeth, it commonly points towards the most prominent part of the cheek. But when no matter is collected, and the disease proceeds from a carious state of the bones, the swelling by degrees arrives at a considerable size, but it spreads equally over the whole cheek, without pointing at any particular part, excepting in its more advanced stages, when the surrounding soft parts becoming diseased, matter sometimes forms in them. Till the skin becomes inflamed, which does not happen till the disease has been of long continuance, the swelling re-

mains perfectly colourless; but the most characteristic mark of it is a remarkable degree of elasticity which it acquires. The bones yield to pressure; but they instantly return to their situation on the finger being removed; and if in this state an incision is made into them, which in different instances I have known done, they are found to be reduced to a soft cartilaginous state, and in the advanced stages of the disease to a consistence somewhat gelatinous.

This kind of swelling is of a nature so very obstinate, that hitherto I have scarcely known any benefit derived from any remedy that has been employed for it. In a few cases where it appeared to arise from carious teeth, the removal of the teeth has put a temporary stop to its progress. But even this has never produced any permanent benefit; I mean in the diseased state of the bones that we are now considering; for the cheek is, like other parts of the body, liable to swellings of a more harmless nature, which yield to the
remedies

remedies commonly employed for them. But in this no material benefit is derived either from medicines or external applications. A long-continued gentle course of mercury, along with decoction of meze-reon, I have sometimes known prove useful ; but neither these, nor any other remedy that I have used, have ever produced a permanent cure.

SECTION VI.

Of EXCRESCENCES on the Gums.

EXCRESCENCES of different degrees of firmness occasionally form on the gums: They are all of a red colour, nearly the same with the gums themselves; but some of them are soft and fungous, while others are firm, and even of a hard warty nature. In some, they are painful; but for the most part they create no further inconvenience than an impediment in speech and mastication. We meet with them in both jaws, but most frequently in the under jaw, and in the inside of the teeth. In some instances they are connected to the gums by a small neck, but in general they adhere firmly through their whole extent.

This kind of excrescence frequently originates from carious teeth, and in a few instances

instances from a carious state of the alveoli ; in which case the removal of the spoiled teeth, and the subsequent exfoliation of the carious part of the jaw, will often accomplish a cure. Like fungous excrescences in other parts of the body arising from a carious bone beneath, as soon as the diseased part of the bone is removed, the excrescence usually begins to shrivel, and at last disappears entirely : But when this does not happen, it should be removed as soon as it gives pain ; and this should be the more readily done, as the operation is attended with little or no risk. An aversion, indeed, generally prevails against meddling with this kind of tumor, either from an idea of its being cancerous, and that it will probably be rendered more inveterate by an operation ; or from a dread of the hemorrhagy that the operation will induce. I know, however, from experience, that there is no cause to be afraid of this. I have extirpated many tumors of this kind ; and I never knew an instance of cancer having follow-

! *Diseases of the Mouth.* Chap. XIV.

ed, or of any hemorrhagy of much importance.

When the excrescence is attached to the gums by a narrow neck, it should be removed by passing a ligature round it sufficiently tight for making it fall off; but when connected to the contiguous parts by a broad base, we are under the necessity of taking it away with the scalpel. The actual and potential cautery used to be employed for this; but as this practice is now laid aside, and never likely to be revived, I do not think it necessary to speak of it further.

In proceeding to the extirpation of the tumor, the patient should be firmly seated opposite to a clear light, with his head supported by an assistant standing behind. If he is possessed of sufficient resolution, no instruments will be needed for keeping the mouth open; but where we cannot with certainty trust to this, which with children is always the case, a speculum oris becomes requisite. Of this instrument, we have various forms. Those in
common

common use are represented in Plate XLI. fig. 2. and 3.; but they occupy too much space in the mouth to admit of the free application of other instruments. To obviate this, I some time ago proposed the one delineated in the same Plate, fig. 1.; and by experience it is found to answer.

A common scalpel will for the most part answer for dissecting the tumor away; but an operator should always be provided with others, particularly with a curved knife, such as is represented in Plate XXI. fig. 1. and likewise with crooked scissars, such as are delineated in Plate XXXVI. fig. 1. and 2.; for in some cases the roots of the excrescence are more easily separated with a curved scalpel and scissars, than with those of a straight form. But whatever instrument is employed, much advantage may be derived from raising the tumor as much as possible from the parts beneath with a dissecting hook; and for this purpose a hook should be used with two fangs, such as is represented in Plate XXXVII. fig. 3. In the

Diseases of the Mouth. Chap. XIV,

1 fe of the operation, care should be
n to remove the disease entirely, at the
: time that the incision should not be
ied so deep as to injure the parts be-
h, unless the tumor is firmly and close-
ttached to them; in which case, it
not be proper to remove a por-
o r but even to go to the
depth of the socket: But as this will in-
cur the risk of injuring the contiguous
teeth by laying their roots bare, it should
never be done when with any propriety it
can be avoided.

After the operation, the bloodvessels
that have been divided should be encour-
aged to discharge freely: But when the
hemorrhagy proceeds too far, it should be
restrained, by the patient being made to
take from time to time a mouthful of spi-
rit of wine or tincture of myrrh; or if
this does not prove sufficient, the applica-
tion of lunar caustic to the bleeding arte-
ries will commonly succeed.

The situation of the sore renders the
application of dressings inadmissible: For
some

some days, however, after the operation, the mouth should be frequently washed with a warm emollient decoction; and afterwards, if a cicatrix does not readily form, the cure may be promoted by the application of lime-water, port-wine, tincture of roses, and other astringents.

S E C.

SECTION VII.

Of Loose Teeth.

THE teeth ought naturally to continue firm till they become loose by the ordinary effects of old age ; But they are liable to diseases which render them loose, and which even make them drop out at early periods of life ; and as this is often the cause of much distress and deformity, it becomes frequently an important object with practitioners.

As the teeth may become loose from various causes, all of which require a different method of treatment, I shall enumerate the most material, and at the same time shall point out those means of cure which seem to be best adapted for each of them.

The

The teeth are frequently loosened by external violence; by falls and blows: and often by an improper use of instruments in pulling the contiguous teeth.

Teeth loosened in this manner, can be made fast only by being kept for some time firmly in their situation; which may be done by pressing them as far into the socket as they will go, and fixing them with ligatures of Indian-weed, catgut, or waxed silk, to the contiguous teeth, and feeding the patient upon spoon-meat till they become firm.

In youth, when teeth are loosened by external violence, as the sockets at this age are complete, they readily become firm again when kept a due time in their situation with ligatures: Nay, even when forced entirely out of the sockets, they will soon become firm, if they are immediately replaced and retained in their situation. I have in several instances put this method of treatment successfully in practice, and no harm can result from the trial. But in old age, whatever
may

may be the cause of teeth becoming loose, the chance of their ever becoming firm is exceedingly small; so that in advanced periods of life, it ought never perhaps to be advised.

The teeth sometimes become loose from thick layers of tartar forming over them and passing between their roots and the gums, and in some cases even between their roots and the sockets. In this case, the removal of the cause, if it has not subsisted long, will commonly remove the effect. That the operation, however, may prove effectual, the tartar should be completely scaled off, and it ought to be done early; for the longer the teeth remain loose, the less chance there is of their ever again becoming firm.

In some instances, they become loose from the gums having acquired a spongy softness, and separating not only at their necks, but often a considerable way down, from the roots. This is sometimes the effect of a long-continued course of mercury; but it is commonly, although often
improperly,

improperly, supposed to proceed from scurvy : We no doubt meet with it as a symptom of real sea-scurvy : but this is a very uncommon disease at land ; while the other, namely, a soft spongy state of the gums, is frequently met with.

When, however, it proceeds from a general scorbutic state of the system, nothing but the removal of this will accomplish a cure ; but when entirely local, topical remedies are alone to be trusted. When teeth have remained long loose, we can never with certainty say that any means we can use will render them firm ; but the most effectual remedy that hitherto has been employed, is a frequent scarification of the gums both in the outside and inside of the loose teeth. The incisions should be carried deeply into the substance of the gums : They should be allowed to discharge freely, and repeated from time to time, as long as any of the teeth remain loose. In this manner, that spongy state of the gums that I have described,

scribed, is often removed, and a disposition produced in them to adhere to the investing membrane of the teeth, by which they often become firm and healthy.

With a view to remove this spongy state of the gums, astringents are commonly prescribed; but I have seldom known any advantage ensue from them: On the contrary, a frequent use of them seems to do harm, by inducing a disposition in the gums, that deprives them for ever of the power of adhering to the parts beneath: At least, I have met with different instances where this was evidently the case; in which by a long-continued use of astringents, the gums became so hard and firm, that the scarifications afterwards employed had no effect in fixing them. They should not therefore be used till adhesion takes place between the gums and teeth, either by means of scarifications, or in some other manner; and this being accomplished, they may be employed with freedom, and even with advantage. The
remedies

medies of this class that are most to be used, are, tinctures of Peruvian bark, and of oak-bark, tincture of myrrh, and strong solution of alum. The mouth should be frequently washed with cold water, strongly impregnated with any of these, at the same time that the patient should be desired not to use the loose teeth, if they have for some time been perfect-firm.

The teeth sometimes become loose by abscesses forming between their roots and the alveoli; especially when the alveoli, from being thus immersed in matter, at last become carious: But this having already been minutely treated of in the fourth section of this chapter, when speaking of gum-boils, I must now refer to what is then said upon it.

It is scarcely necessary to mention the loosening of the teeth that occurs in old age; for this takes place from a cause for which there is no remedy: Not from the roots of the teeth decaying, or from
their

their being pushed out of their sockets, but from a real annihilation of the sockets; probably in consequence of the osseous matter of which they are composed being absorbed, while nature having now no use for teeth, does not continue to supply it.

S E C.

SECTION VIII.

Of CLEANING the TEETH.

THE teeth are apt to become foul from different causes, and frequently require the assistance of a dentist to render them clean.

1. They sometimes lose their natural healthy colour, and acquire a dusky yellow hue: Or they become to a certain degree black, without any adventitious matter being perceptible on any part of them.

2. At other times they become foul, and give a disagreeable putrid taint to the breath, merely from a too long remora of the natural mucus of the mouth.

3. But the most frequent cause of foul teeth is a calcareous matter that forms on them, commonly termed the Tartar of the

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th, which seems to be a deposition in the saliva, as calculi in the bladder from the urine. Few people are entirely exempted from this; but some are much more liable to it than others, inasmuch, that I have known different instances, of the teeth becoming thickly incrustated with it in the course of a few weeks after having been completely freed from it,

Tartar first appears in the fore-teeth, and in those parts of them that are least liable to be rubbed by the tongue or lips. Hence it is first perceived on the outside, in the angles between two of the teeth, near to the junction of the gums. The ordinary effects of mastication prevents it in general from spreading towards the points of the teeth: but the disposition to form it is in some constitutions so great, that I have known it proceed from the gums upwards even over the flat surfaces of the grinders; and in such instances, when not removed, it is apt to spread over the whole teeth, and to give the appearance of a continued

tinued incrustation from one end of the jaw to the other. In some cases again, instead of passing over the whole, it seems to fix more particularly on one or two of the teeth; and in such instances, the deposition of this matter goes on so quickly as to give cause to suspect that the whole calcareous matter of the mouth is by some cause or other attracted to this particular point. I have known one or two teeth completely covered with it in the space of a few weeks, while none of it formed in any other part of the mouth. In some these partial incrustations are so large as to disfigure the external appearance of the cheek; and, by those not accustomed to this branch of practice, they are sometimes mistaken for diseases of a worse nature: they have even been treated as exostoses arising from the jaw-bone.

While the tartar consists of a thin scale only, and as long as it is confined to the external surface of the teeth, and does not prove hurtful to the gums, it seldom meets with much attention: But when

it forms in any considerable quantity, it very commonly hurts the gums, by producing slight ulcerations upon those parts to which it lies contiguous; or, it insinuates between the gums and the alveoli, so as to separate them to a considerable depth from each other. In either of these events, those means should be employed by which we know that it will be most effectually removed.

When the teeth have remained long covered with any kind of extraneous matter, if it has acquired any degree of firmness, it cannot be removed but with the help of instruments. Even a slight discolouring, although not attended with any perceptible covering of an adventitious matter, when of long continuance, can seldom be removed in any other way. But when once the teeth are thoroughly scaled with instruments, they may in general be preserved in this state by moderate friction with a brush. Frequent washing with cold water; and rubbing every second or third morning with burnt bread; Peru-

vian

vian bark ; cream of tartar ; chalk or any other mild substance in fine powder, will for the most part keep them clean and white : But this we must observe is not universally the case ; for the tendency I have mentioned to foulness of the teeth, especially to a deposition of tartar, is in some instances so great, that the greatest pains and attention does not prevent the renewal of it. This, however, is not frequent ; for it is well known, that due attention to cleanliness will very generally prevent every formation of this kind.

I have said, that when once the teeth have become foul, they cannot be cleaned but with the help of instruments. This is at least the best, as it is the safest and surest method. Rubbing the teeth with acids of a certain strength, will indeed render them white ; for the tartar and other kinds of matter that adheres to them being soluble in acids, a frequent use of them removes it completely ; and we accordingly find, that acids of one kind or another form the basis of almost every

so improperly applied, as to remove the enamel ; but this must always be the fault of the operator : For every incrustation to which the teeth are liable may be taken off with safety, and without hurting the teeth.

In Plate LVIII. instruments of various forms are represented for this operation. Figs 2. 3. and 4. are the best, and will answer for most purposes ; but the others are sometimes necessary for the removal of such parts of the incrustation as form between the teeth. They should all be moderately sharp, otherwise the operation is done with difficulty ; but the edge of none of them should be fine, otherwise it will be apt to turn, and even to break, with the force necessary for scaling off the tartar.

In performing this operation, the patient should be placed upon a low seat, with his face opposite to a clear light, and his head supported by an assistant. The surgeon himself should be seated upon a chair somewhat higher. It is commonly indeed done while the operator is stand-

teeth remains smooth and sound, moderate friction with the edge of a scaling instrument will frequently prove useful; and if the operation is done with caution, no risk will accrue from it. But when the teeth become black from this cause, we sometimes find the enamel corroded, or perforated as it were with an infinite number of small holes; and this, I must observe, is the worst kind of foulness to which they are liable: For it is difficult to remove, and when removed, it in general soon returns, nor does it commonly stop till all the teeth which it attacks are destroyed.

As this kind of foulness cannot always be removed with instruments, we endeavour to dissolve it with some chemical preparation. All the mineral acids will do it in the most effectual manner; but for the reasons I have given, they ought never to be used. I have commonly employed saponaceous, or even pure alkaline applications; by which the teeth may be often rendered perfectly clean without any injury being done to them. A strong lather
of

of common soap will often answer; and a solution of salt of tartar applied over the teeth with a small pencil or brush, proves in some instances equally successful.

When in this manner the foulness is removed, the most effectual means for preventing a return of it, is to wash the teeth frequently with cold water, and to rub them from time to time with one of the powders that I have mentioned. I have sometimes, too, thought, that repeated applications of tincture of Peruvian bark have served to prevent it. As this variety, indeed, of foul teeth seems to depend upon some degree of putrescency; for it is evidently attended with a caries or mortified state of the diseased teeth; there is cause to imagine that antiseptics of every kind would prove useful in the method of cure.

For the purpose of applying powders and other applications to the teeth, brushes of different forms, and various kinds of roots properly prepared, are daily used. Lucerne and alkanet roots dried and beat

at

at one end into the form of a brush, are much employed for it, and they may be used both with safety and advantage for cleaning the interstices between the teeth: But neither these, nor any kind of brush should be employed for rubbing the roots of the teeth and upper parts of the gum; for as their points pass between the gums and the sockets, they are apt to separate the one from the other, from which much mischief is apt to ensue. For this reason, I always employ a piece of sponge fixed in a small handle, which may be used with entire safety.

PLATE XII

Fig. 1.



Fig. 2.



Fig.

3.



Fig.

4.



EXPLANATION
OF THE
P L A T E S.

PLATE XII.

Fig. 1. **A** Delineation of some parts of the eye, referred to in different parts of Chapter XI*.

a, These points represent the openings or orifices of the glands of Meibomius; by which, a viscid glutinous substance, commonly termed the Gum of the Eyes, is separated and discharged.

d, The caruncula lachrymalis.

c, The

* Vide Descriptionem Anatomicam Oculi, Iconibus illustratam. Auctore Johanne Getfreid, Zinn. M. D.

Explanation of the Plates.

The membrana semilunaris, which is to have some effect in directing the tears towards the puncta lachrymalia *b*, from whence they are conveyed by their corresponding ducts into the sacculus lachrymalis *c*, and afterwards to the nostril by the nasal duct.

In the cure of the fistula lachrymalis, it is of much importance to be well acquainted with the anatomy of these parts; of which this diagram will convey a more exact idea than could be given by description.

Fig. 2. A sharp-pointed instrument, from a figure termed a *Hastæ*, by which the eye may be fixed in extracting and couching the cataract; but it does not answer the purpose so well as different instruments to be hereafter described.

Fig. 3. A speculum oculi in common use, but it does not fix the eye so well or so easily as the speculum delineated in Plate XIV. or the instrument, fig. 5. Plate XXII.

Fig.

PLATE XIII.

Fig. 1

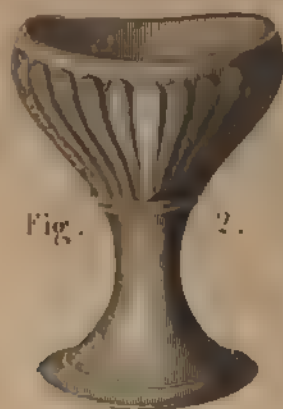


Fig.

2.

Fig. 4.



Fig.

3.



Fig. 5.



Fig. 6.



D. L. & S. Sculp

Fig. 4. A very useful form of knife for various operations on the eye-ball and eyelids, particularly for cutting or scarifying turgid bloodvessels on the eye: A lancet is commonly used for this; but this knife is used with more steadiness, and being round or blunt on the back, it does not so readily injure the contiguous parts.

PLATE XIII.

Fig. 1. A bandage for the eyes, usually termed goggles, by which any quantity of light can be admitted that a patient may wish for, while, at the same time, the eyes are sufficiently protected, without being kept too warm, or too closely tied down, as is commonly done with the bandages usually employed. It consists of two pieces of polished timber, excavated into the form of cups, but open at both ends, and corresponding to the size of the eyes for which they are intended: And these being covered with black or green gauze, they are fixed by the riband tied round the head.

Fig.

Fig. 2. A cup of an oval form, for the purpose of bathing the eyes either with water or any other liquid. Being of an oval form corresponding to the size and figure of the orbit, the eye can be more effectually washed or bathed in any liquid contained in it than in any other manner.

Fig. 3. A bag of *refina elastica*, fitted with an ivory pipe for the purpose of injecting warm water between the eyelid and ball of the eye, in order to remove sand, lime, or any other extraneous matter that happens to be lodged between them.

Figs. 4. and 5. Pipes of different forms, that may be occasionally fitted to one of these bags.

Fig. 6. A flat-hook, either of polished silver or steel, for separating the eyelids from each other. This is commonly done by the fingers of the operator, or by an assistant; but in many of the more minute operations on the eye, this kind of flat-hook is employed with much advantage:

PLATE XIV.



Fig. 4.



vantage: so that every surgeon in this branch of business should be possessed of it.

PLATE XIV.

The figures in this plate represent different views of an instrument frequently mentioned in the course of this work. Various forms of a speculum oculi have been delineated in books; but they have seldom been used in practice. They have in general been found either to compress the eye too much, so as to induce pain and inflammation; or not to fix it sufficiently. The instrument here represented, when properly polished, creates little uneasiness, at the same time that the eye may be so compressed with it as to be kept perfectly steady. The handle may be either of steel or timber, but the rest of it should be made of silver or fine polished steel. Operators should be provided with specula of different sizes. The views here delineated are taken from a size that answers for most part of adults.

A well-adapted speculum is an useful instrument in many diseases of the eyes, but particularly in the operations of couching and extracting the cataract. Some having imagined, that it may be an advantage to be able to withdraw the speculum while the knife or needle remains in the eye, it has been proposed to leave a vacant space for this purpose in the circle of this instrument, which surrounds the eyeball, as is represented in fig. 3. The speculum should be always kept, however, upon the eye, as long as either the extracting knife or couching needle remains in it, otherwise the eye cannot be rendered sufficiently steady: But to those who are of a different opinion, this form of the instrument delineated in fig. 3. will answer the purpose.

PLATE XV.

Fig. 1. A couching needle of the best form that I have seen. It penetrates the eye more readily than the round needle,
fig.

PLATE XV.

Fig. 2.



Fig. 3.

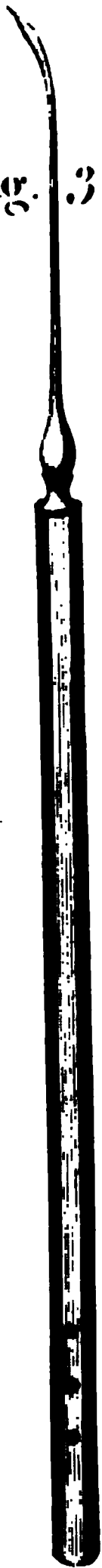


Fig. 4.

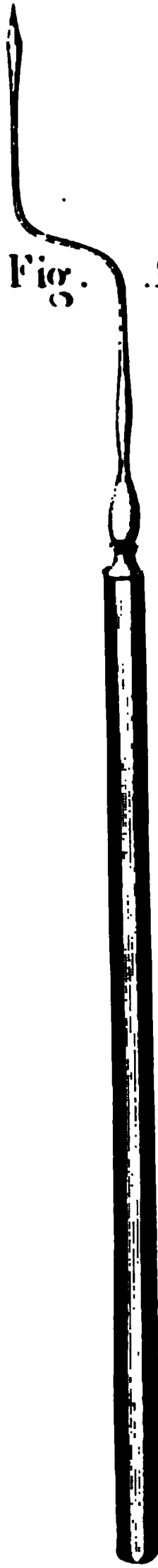


Fig. 5.





g. 2. and the cataract is more easily depressed with it.

Fig. 3. A needle of a flat form, similar to fig. 1., with a small curve near to the point. With this curve I have sometimes found that the cataract is more easily depressed than with a straight needle; but I have not yet used it so frequently as to be able to speak with certainty about it.

Figs. 4. and 5. Two needles for performing the operation of couching, by entering the instrument at the internal angle of the eye, and pushing it out towards the outer. By which means the operation may be done upon the right eye with the right hand; whereas, with the common straight needle, the left hand must be used to hold the right eye; a degree of steadiness, which some practitioners cannot always attend to with the left hand.

All these instruments are delineated of the proper size and shape, so as to be fit for use. The handles should be of light timber, and the steel part of polished in the most exquisite manner.

ner. None of them should exceed forty grains in weight, including that of the handle.

PLATE XVI.

Fig. 1. A form of a knife for the operation of extracting the cataract. It should be tolerably firm, and highly polished. Near the point both sides of the knife should be sharp, by which the cornea is more easily penetrated, but backwards the upper edge of it should be round; which not only gives more strength to the instrument, but makes the risk less of hurting the iris.

Fig. 2. A knife of the same form in the cutting part of it with fig. 1. But by means of the bend, the operation may be performed on the right eye with the right hand of the surgeon.

Fig. 3. A knife commonly used in Germany in extracting the cataract.

Fig. 4. A small scoop for removing either the whole body of the lens, or any part of it, when in extracting the cataract.

PLATE XVI.



1.

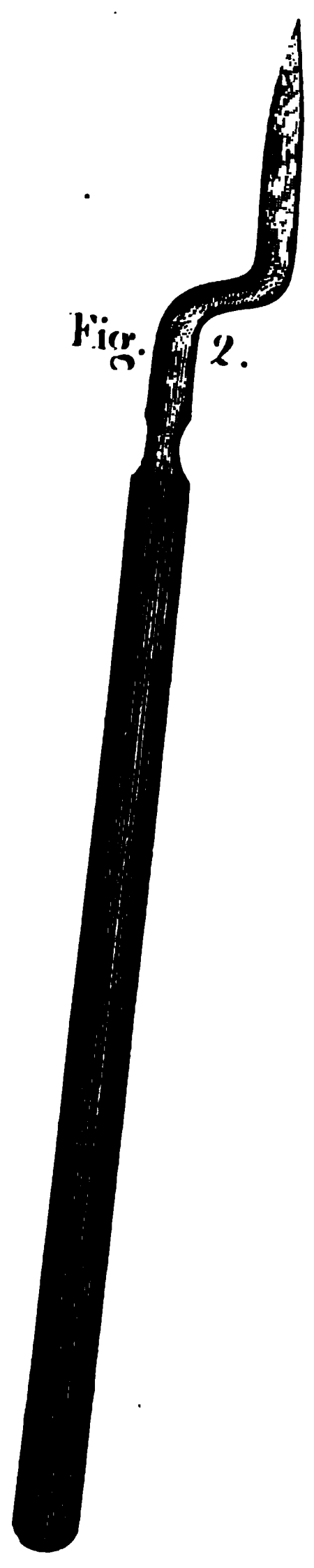


Fig. 2.

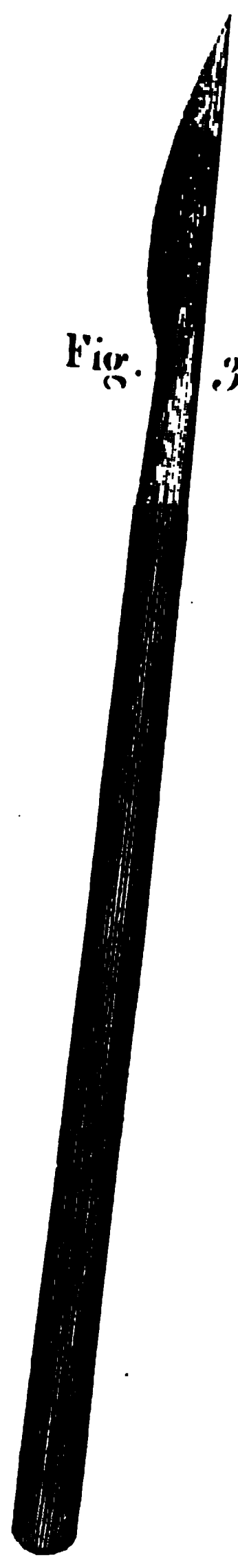


Fig. 3.



Fig. 4.

PLATE XVII.

Fig. 1.

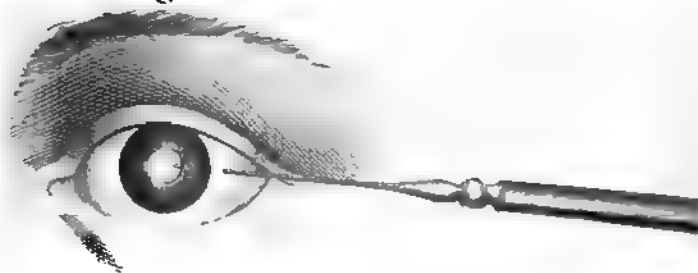


Fig. 2.

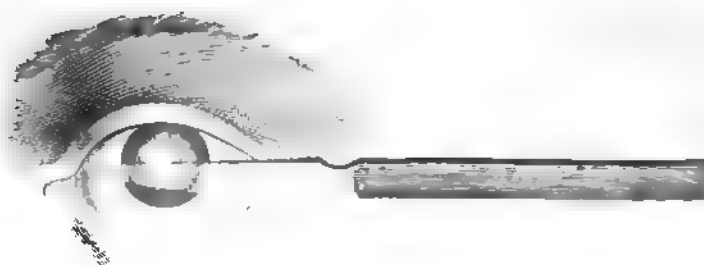


Fig. 3.



Fig. 4.



PLATE XVIII.

Fig.1.



Fig. 2.



Fig. 3.



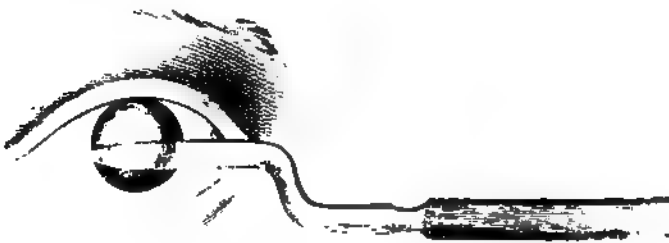
Fig. 4.



Fig. 5.



Fig. 6.



ra^ct it happens to lodge either in the pupil or anterior chamber of the eye, between the iris and transparent cornea.

PLATE XVII.

Fig. 1. A delineation of the eye with the couching needle inserted into it.

Fig. 2. The knife employed for dividing the cornea in extracting the cataract, is here inserted across the eye, between the cornea and iris. And in fig. 4., the cut is delineated which ought to be formed in the cornea in the usual method of performing this operation. Fig. 3. represents the cornea divided in the superior part of it, in the manner I have mentioned in describing the method of extracting the cataract.

PLATE XVIII.

Fig. 1. A view of the right eye with one of the curved needles of Plate XV. inserted into it; by which it is evident that a cataract may be couched in the right eye with the right hand of the surgeon.

M m 3

Fig.

Fig. 6. Represents a curved knife inserted beneath the cornea in the operation of extracting the cataract with the right hand from the right eye.

Fig. 2. A sharp-curved probe for removing the cataract, by making an opening behind the iris, in the manner I have advised in the Chapter on that operation.

Fig. 4. Small forceps, which may occasionally be employed for the same purpose.

Fig. 5. A flat-curved probe, either of gold or silver, for inserting through the pupil, in order to tear or form an opening in the capsule of the lens, so as to admit of an easy expulsion of the cataract.

Fig. 3. A tube of steel, with an edge sufficiently sharp for penetrating a hard bone, by which a portion of the os unguis, corresponding to the size of the tube, may be removed, when in the operation for the fistula lachrymalis this may be judged proper.

ticular form of the part on which it is to be applied.

The instrument here delineated is intended for the left eye; but it is easily made to answer the right eye, by moving the bar *D* into the slit or opening on the opposite side of the plate *AA*.

Fig. 2. A trocar and canula, for perforating the os unguis in the operation for the fistula lachrymalis.

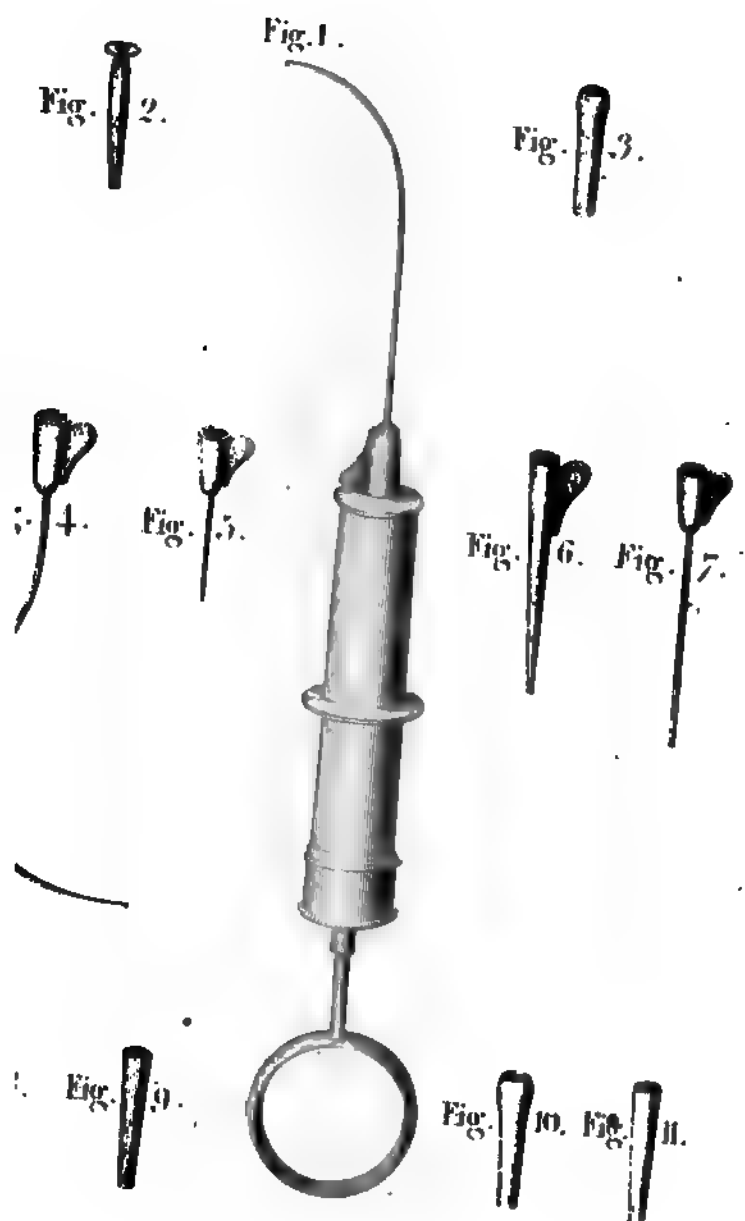
Fig. 3. The stilette; and, fig. 4. the canula, represented separately.

Fig. 5. A curved trocar; the instrument commonly employed for the fistula lachrymalis; but the straight trocar, fig. 2. answers better.

PLATE XX.

Fig. 1. A silver syringe, for the purpose of throwing liquids into the lachrymal passages. Fig. 4. A curved tube, adapted to the syringe, and of a proper size for being inserted by the nostril into the extremity of the nasal duct of the lachrymal sac. Fig. 5. A small tube, of a size corresponding

PLATE XX.





sponding to the lachrymal puncta, for throwing injections through these openings into the sac. Figures 6. and 7. Tubes of a larger size, for throwing liquids through the sac into the nose by an external opening, when this has either been made by an incision, or when the sac has burst, in consequence of tears and matter collecting in it.

Figs. 2. 3. 8. 9. 10. and 11. Tubes of different forms, which have been employed in operating for the fistula lachrymalis, when the passage through the os unguis cannot in any other manner be kept free and pervious. Of these, however, figs. 3. and 10. are the best. The small bulge with which they are formed, not only prevents them from passing through the opening altogether into the nose, which cylindrical tubes are apt to do, but when they are once properly fixed, it prevents them from rising against the skin, which they are otherwise ready to do. The tubes here represented, are of sizes, both as to length and thickness, which answer for the most

Explanation of the Plates.

part of adults ; but these are circumstances which must depend upon the nature of every case, and will accordingly be liable to some variety. Tubes for this purpose should be made of gold, polished in the finest manner.

PLATE XXI.

Fig. 1. A curved scalpel, employed by some practitioners in extirpating the eyeball. By its form it is supposed to be well suited for this purpose ; but the common straight scalpel I have repeatedly found to answer better.

Figures 2. 3. and 4. Curved probes, of a proper size for inserting by the nostril into the nasal duct of the lachrymal sac, by those who wish to clear these passages in this manner.

Fig. 5. and 6. Probes of a smaller size, for inserting into the lachrymal puncta.

PLATE XXII.

Fig. 1. The knife commonly used by Mr Pellier in extracting the cataract. It should

PLATE XXI.

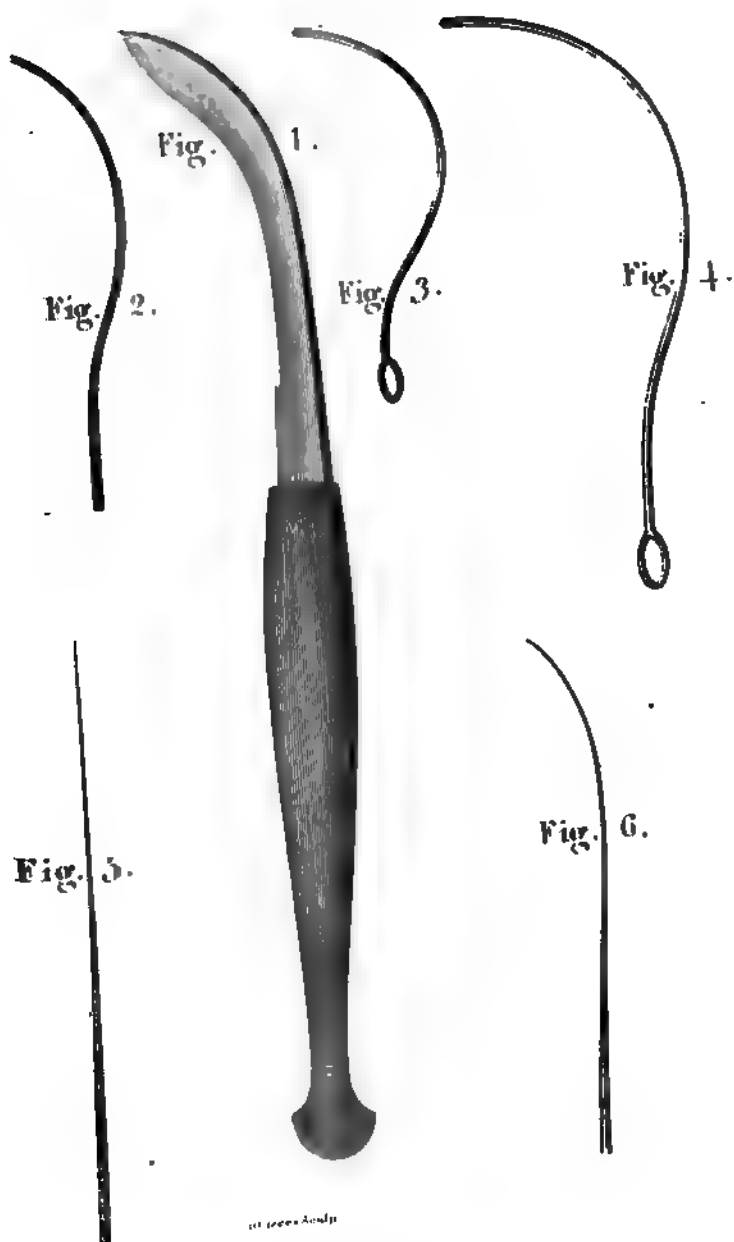




PLATE AMI.



1.



Fig. 2.



Fig. 3.

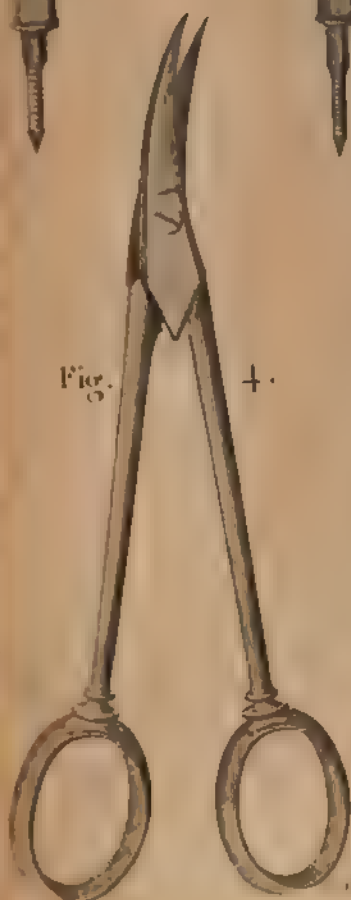


Fig. 4.

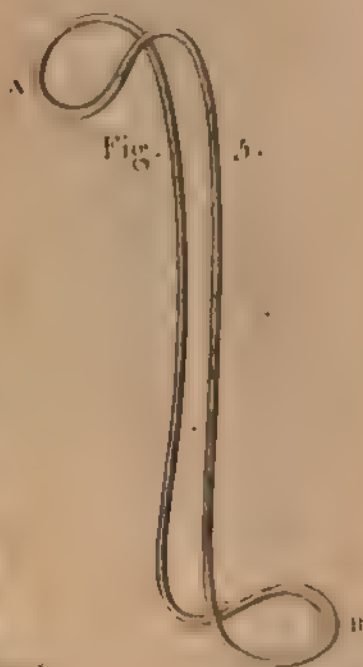


Fig. 5.



should be highly polished, and so sharp as to penetrate the eye with ease, at the same time that it should be sufficiently strong for dividing the cornea without yielding. This, as well as the other two knives in this plate, are made to fit the handle represented in Plate XXIII. fig. 1.

Fig. 2. A knife exactly of the same form and size with the other; only in this, that side which passes next the iris is round or convex, with a view to protect that membrane from being injured, which it is apt to be when the common flat knife is employed in eyes that are not prominent.

Fig. 3. A probe-pointed knife, which in some cases may be employed with advantage for finishing the operation, when by any accident the aqueous humour escapes before the point of the other knife has pierced the opposite side of the cornea: But for a more particular account of the method of using it, I must refer to what has been said in describing the different steps of the operation.

Fig.

Explanation of the Plates.

Fig. 4. Curved scissars of a proper size for every operation on the eyes where scissars are needed: Indeed every practitioner who operates on the eyes should have them.

Fig. 5. This is the only speculum which Mr Pellier employs. It may be made of gold or silver wire, or of any other metal. It is here represented of a full size for adults, both in length and thickness of wire. In using it, one of the curves is placed upon the upper eyelid, directly behind the cartilaginous border; and being given to an assistant, a degree of force is applied with it sufficient for fixing the eye; which is easily done, if the operator at the same time makes some resistance, by placing the index and middle fingers of one hand on the under edge of the orbit, so as to compress the eye beneath.

All the instruments of this plate are represented of the full size.

PLATE



PLATE XVIII.

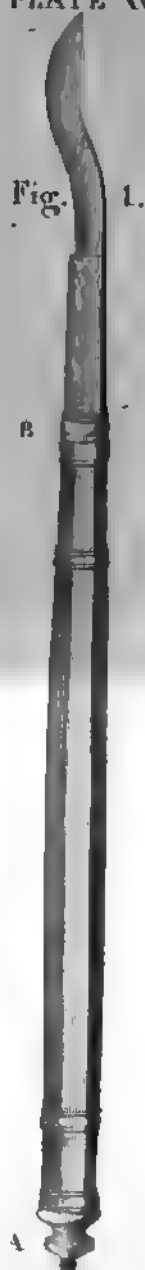


PLATE XXIII.

Fig. 1. A knife used by Mr Pellier in some cases for extracting the cataract. It is fixed in the handle at *B* by a male-screw, fitted to a female screw, which is turned by the nut *A*. This handle may be made to answer figures 4. and 5. as well as every knife employed in operations of the eyes.

Fig. 2. An instrument for depressing the under eyelid. When an assistant cannot be procured, it may often prove useful. The two flat hooks at the upper end of it being fixed on the cartilaginous edge of the eyelid, the other end of it hanging over the cheek, by its weight draws it down.

Fig. 3. An instrument for determining the quantity of skin to be removed in operating for the Trichiasis or Inversion of the Eyelids. When it is found necessary to remove a portion of skin from beneath the under eyelid, or from the superior part of the upper palpebra, it may be done
with

with a common scalpel, while an assistant supports it from the parts beneath either with his fingers alone or with forceps made for the purpose; but this instrument answers better, as by means of it the quantity of parts to be removed can be ascertained, and cut off with more precision.

Fig. 4. A knife for opening small collections of matter on any part of the eyeball. Being blunt on the back, and round on the end, it is used without any risk of injuring the contiguous parts.

Fig. 5. A sharp-pointed curved knife for dividing the vessels of the eye or of the palpebræ.

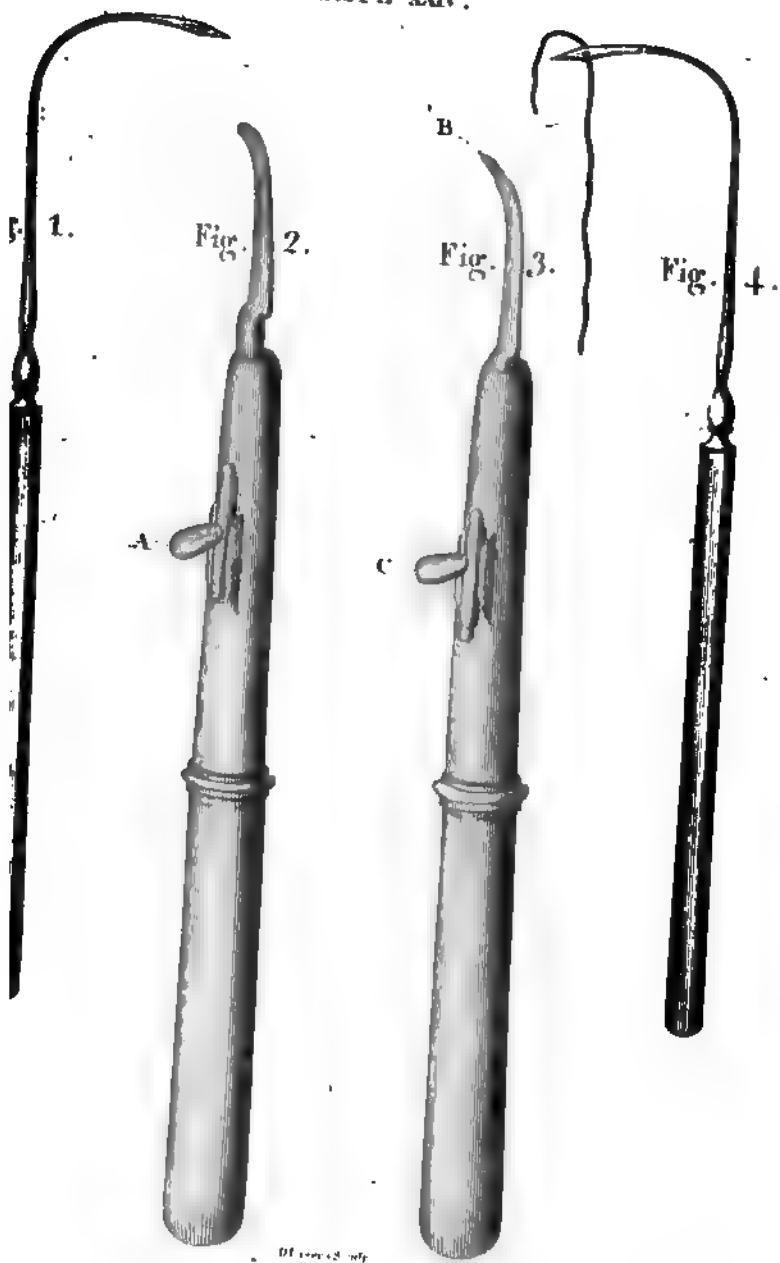
These instruments are all delineated of the full size.

PLATE XXIV.

Fig. 1. A curved needle fixed in a handle, for passing ligatures beneath the pterygium and other small excrescences sometimes met with on the external surface of the eyelids, and not unfrequently on the eye itself. Fig. 1. is intended for tu-

mors

PLATE XXIV.





mors on the right eye, and to be used with the left hand of the surgeon. Fig. 4. is for the left eye, to be used with the right hand.

Figs. 2. and 3. An instrument termed a Cistatome, being meant for opening the capsule of the crystalline lens. It may be made of gold or any other metal. It is held between the thumb and fore and middle fingers of the right hand, care being taken to place the thumb upon the button *A* or *C*, which is connected with a sheath that covers the sharp point *B*. The hand being supported on the cheek by the ring-finger and little finger, the point of the instrument covered with the sheath must be cautiously passed through the pupil till it reaches the lens; when the button *C* being drawn back with the thumb, the point of the instrument is thus set at liberty, without the hand being moved. This is an ingenious invention, and answers the purpose with ease and safety.

These instruments are all represented of the full size.

PLATE XXV.

Fig. 1. A small scoop, which answers better than any other instrument for removing small stones, peas, and such like substances, from the nostrils or ears.

Figs. 2. 3. 4. 5. and 6. Are instruments employed by Mr Pellier for the operation of the *Fistula Lachrymalis*. Fig. 2. is a perforator and conductor for clearing the passage through the *os unguis* into the nose. Figs. 5. and 6. are tubes for leaving in the passage. Fig. 3. is a compressor for fixing them after they are inserted; and the easiest method of inserting a tube is by putting it upon the conductor after it is passed through the compressor, as is represented in fig. 4. The conductor, armed with the tube and compressor, being passed through the passage into the nose, must be withdrawn; when, by means of the compressor, the tube may be firmly fixed.

These instruments are all represented of the full size.

PLATE

PLATE XXV.

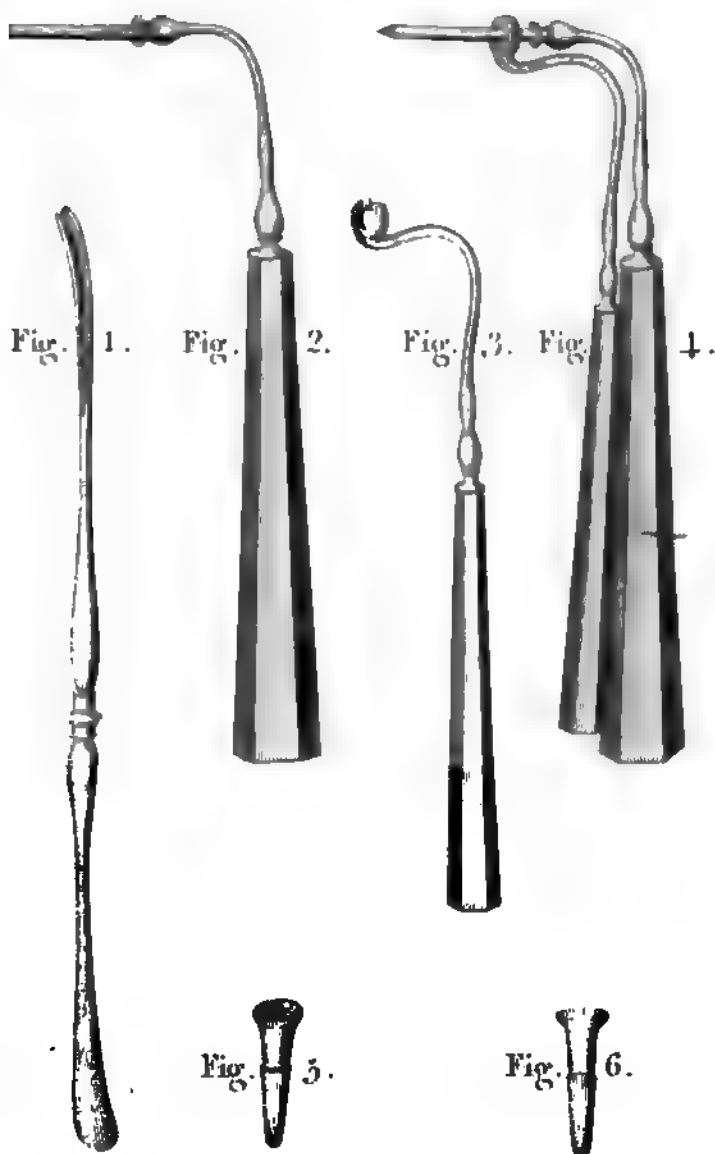
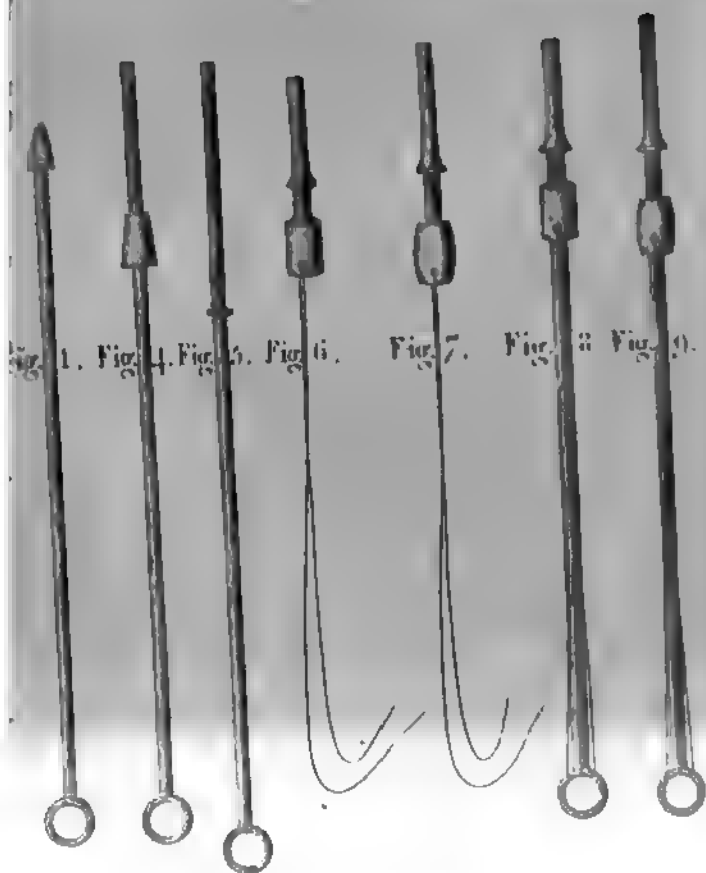




PLATE XXVI.



J. L. Green & Sons

PLATE XXVI.

The figures in this plate represent instruments of Mr Wathen's for the cure of the fistula lachrymalis.

Figs. 2. and 3. A tube and tent for inserting into the natural passage between the lachrymal sac and the nose: These instruments may either be of lead, silver, or gold: When of silver or gold, it is necessary to have one or two turns of a female screw in the top of the cup or cylinder; but not when formed of lead.

Fig. 4. The stile of the tube.

Fig. 5. The stile of the tent.

The stiles are meant to conduct their corresponding tubes and tents into the passage. And,

Fig. 1. A screw stile for the purpose of removing the tubes or tents when necessary, for which purpose, however, small forceps answer better.

Figs. 6. and 7. A tube and tent with a string fixed to an aperture at the top of each.

Figs. 8. and 9. A tube and tent with a stile and string united to each, and ready for use.

These tubes and tents, Mr Wathen observes, are of the largest scale; There are two inferior screws; the middlemost of which proves most generally applicable.

I have thus given a delineation of this part of Mr Wathen's apparatus, with which I doubt not that the fistula lachrymalis may be cured; but I consider it in every part as inferior to what I have delineated in Plate XXV., both for the form of tubes and method of introducing them. For a more particular detail, however, than can be given here of the method of using Mr Wathen's apparatus, his book should be consulted; in which many valuable observations will be met with*.

PLATE

* Vide A New and Easy Method of curing the Fistula Lachrymalis; the second edition, &c. By Jonathan Wathen Phipps, surgeon, London.

PLATE XXII.

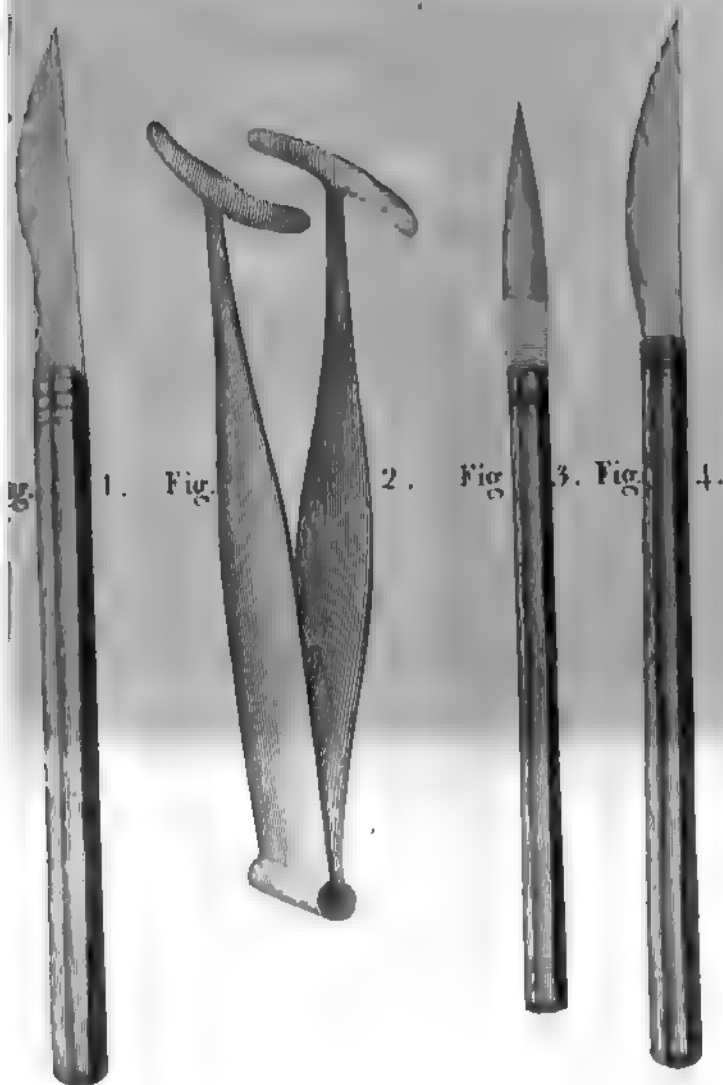


Fig. 5.



Fig. 6.

PLATE XXVII.

Fig. 1. Mr Berenger's knife for the operation of extracting the cataract.

Fig. 3. Baron Wensel's knife.

Fig. 4. Dr Richter's knife.

Fig. 2. A speculum oculi, the invention of my friend Dr Wardrop, whose experience in diseases of the eyes has been very extensive.

This speculum will be found very useful when the operator cannot have the aid of a good assistant. In scarifying the vessels of the eye, this instrument answers the purpose of holding back the eyelids completely, and gives a sufficient degree of steadiness to the ball of the eye. The inside of the eyelids are also turned outwards, at the same time that they are pushed backwards, so as to expose the parts in the most complete manner.

The hinge should be made very easy, that the operator may have little resistance to overcome, and thus he will be

N n 2

more

more sensible of the degree of pressure to be made upon the eye. The other parts must be so firm as not to yield to any force that may be employed. The points of the forceps are connected with the semicircular pieces obliquely, to prevent the hand that holds the instrument from obstructing the light.

These semicircular parts should be covered with thin leather that has some degree of roughness.

In using the instrument, it should be placed shut upon the eyelids, and gradually opened as the eyelids are pushed backwards; thereafter as much pressure is to be made as may be found necessary.

Fig. 5. Small forceps, used by Baron Wenzel, for taking out the capsule of the lens, when in the operation of extracting the cataract it is found to be opaque.

PLATE XXX.

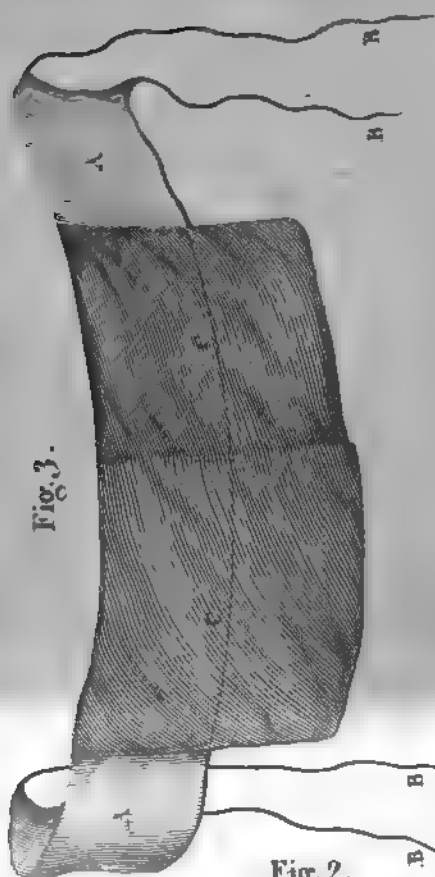


Fig. 4.



Fig. 2.

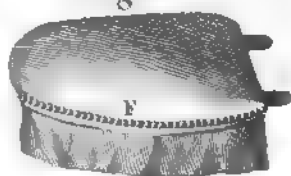


Fig. 1.

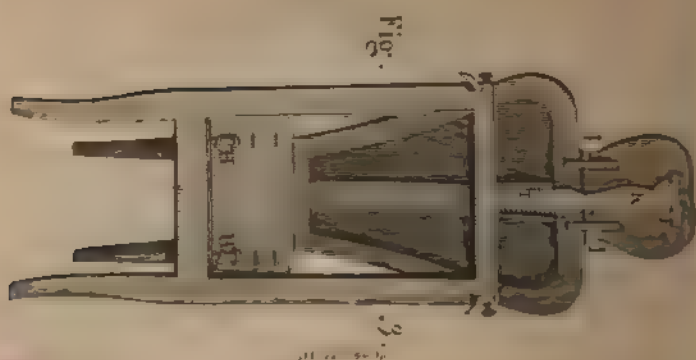
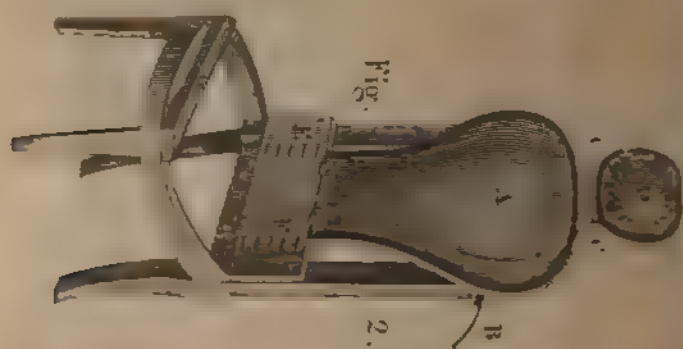
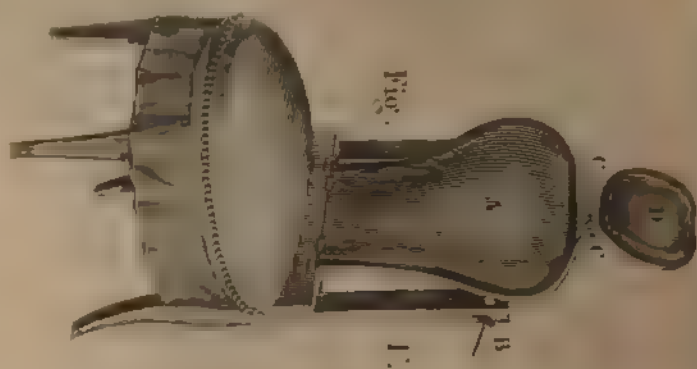


Fig. 1.



PLATE XXX.

PLATE XXXIII.



PLATES XXVIII. & XXIX.

The figures in these plates form a very useful part of the apparatus of an oculist. It is employed by Mr Bischoff*.

All the figures of Plate XXVIII. represent a chair on which the patient is placed during the operation of extracting the cataract, by which his head is kept much more fixed and steady than it can possibly be in the usual way, supported on the breast of an assistant; and as steadiness is of the greatest importance in all operations on the eye, the use of this chair may be extended to many others.

Figs. 1. and 2. Represent a strong made chair, to which is fastened a back *A*, which on each side by means of a screw *B*, moves backwards and forwards. In the top *D*, which can at *C*, if necessary, be turned back, is a concave cloth cushion

N n 3

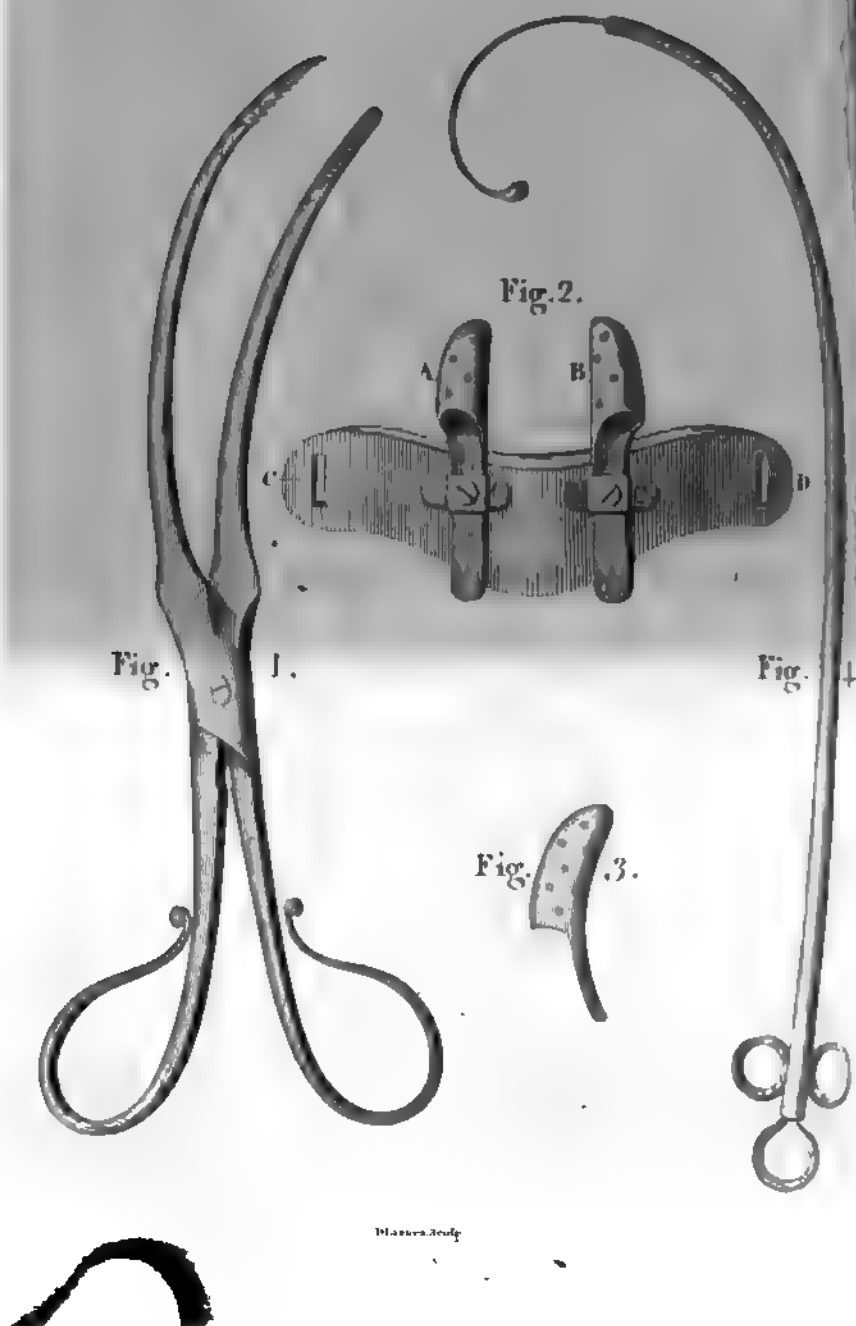
* For a more particular account of this apparatus, see a Treatise on the Extraction of the Cataract, by Frederick Bischoff, F. M. S. Oculist to his Majesty in the Electorate of Hanover, and to her Majesty in England.

shion for the greater security of the head, and to prevent it from slipping: Being made of a height to admit of the operator standing, there are different pieces of wood, Plate XXIX. fig. 1. to put under the cushion, fig. 2.; each of these pieces of wood have two pegs *EF*, which fit corresponding holes in the seat of the chair: The cushion, fig. 2. Plate XXIX. is made in a wooden frame, to which is fixed two projecting pieces of iron, which go through the holes *EF* in the chair, fig. 2. Plate XXVIII. and fasten at the back, in the back-part of the chair with an iron peg, fig. 3. *HH*.

In fig. 3. Are two bars *II*, to support the top: *K* is a stand to prevent the top from falling, received into the notches *L*, which enable the operator, by their different distances, to incline the moveable top more or less backwards as he may find convenient.

Fig. 1. Plate XXIX. represents a very useful bandage for different operations on the eyes, particularly for the after-treatment

PLATE XXX.



ment of the operation for the cataract. It consists of a double piece of linen *AA*, about three fingers broad, and proportioned in length to the circumference of the head: At each end are fixed two strings *BB* to tie it on the forehead: To this piece of linen are sewed two pieces of double, dark-coloured silk or linen, *CC*, about six fingers square, so that the piece which covered the diseased eye should be a little under the other piece, that no light may possibly reach the eye on which the operation has been performed; while some degree of light, if the operator thinks proper, may be admitted to the other.

Fig. 4. is a knife for extracting the cataract, nearly the same, although somewhat different from Dr Richter's, Plate XXVIII. fig. 4.

PLATE XXX.

Fig. 1. Forceps of a convenient form for extracting small bones or other substances from the throat.

N n 4

Fig.

Fig. 2. An instrument for preventing the nostrils from collapsing after the operation described in Vol. IV. Chap. XII. Sect. IV. *AB*, Two moveable tubes for inserting into the nostrils, to be retained in their situation by a riband passed through the opening *CD*, and tied on the back-part of the head.

Fig. 3. A side view of one of the tubes.

These instruments are all represented of the full size. They, as well as some others in this volume, are taken from some elegant engravings published by Mr Bambrilla of Vienna.

Fig. 4. A tube for the purpose of conveying a waxed ligature through one of the nostrils into the fauces, when the ligature being drawn out at the mouth, a cushion or pad is attached to it, when it is drawn forcibly into the back-part of the nose, for the purpose of putting a stop to hemorrhagies from the nostrils that do not yield in any other manner. See Vol. IV. Chap. XII. Sect. II.

PLATE

PLATE XXVI.

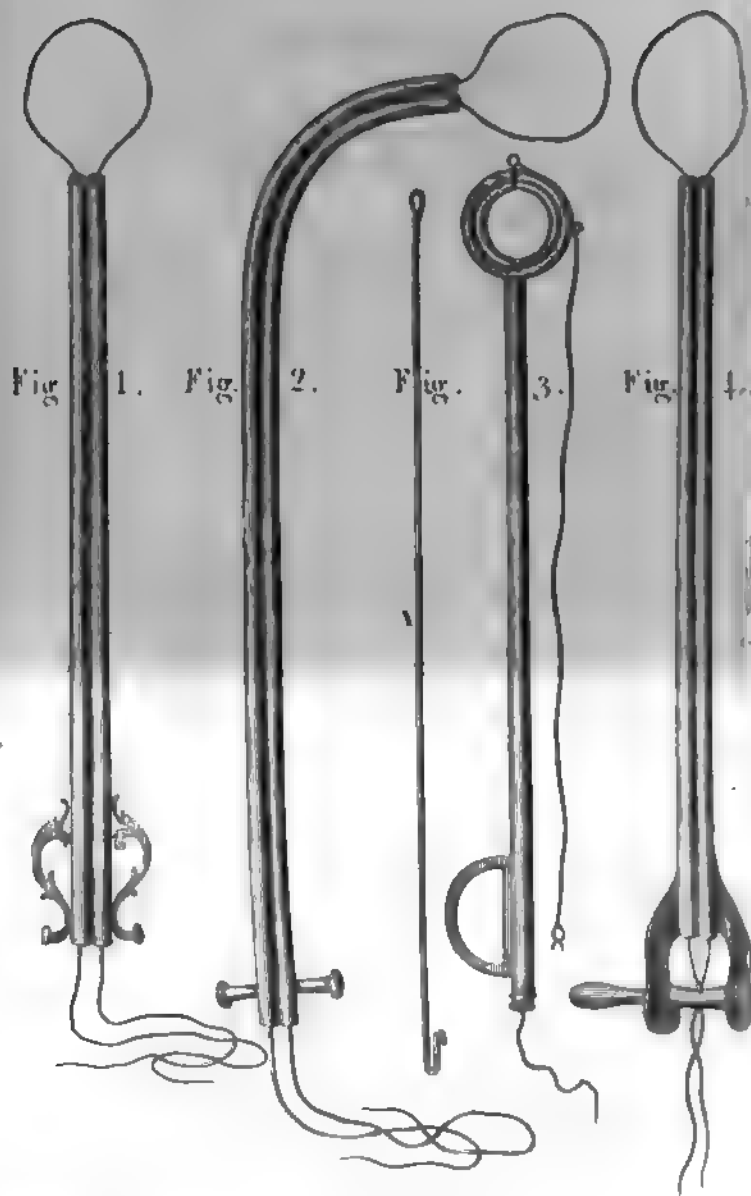


PLATE XXXI.

Fig. 1. A double canula for fixing ligatures upon polypous excrescences either in the nose, throat, ears, or vagina. The ligature may either be of catgut or pliable silver-wire.

Fig. 4. Another canula for the same purpose. When the other is used, the ligature is tied round the handles of the instrument. In this the ligature passes through a moveable handle, and is easily turned to any degree of tightness.

Fig. 2. Is a canula of the same kind with the others ; but being crooked, it is better calculated for removing polypi deeply seated in the throat. The method of using these instruments is described in different parts of Chap. XII. Sect. V.

Fig. 3. Is an instrument for passing a ligature over the uvula. A thread being passed through the tubular part of the handle with the probe *A*, a noose is then formed on it ; and being lodged in the
groove

Explanation of the Plates.

ove on the inside of the ring, the other of the thread is passed through the two all holes on the outsides of the ring ; and thus it is ready for use. This is commonly termed the Ring of Hildanus, from the name of its inventor. All these instruments are represented of the full size.

PLATE XXXII.

Fig. 1. of the bones of the head, representing a polypus in the throat hanging down behind the velum pendulum palati, with a ligature passed over it and fixed at the root of it, with a double canula inserted through one of the nostrils.

Fig. 2. This figure is taken from Mr Cheselden. It represents a polypus in the nose, with part of it passing back to the throat, and the rest into the nostril, with a ligature inserted from the nostril into the throat, in such a manner as to include the root of the excrescence in its doubling. By afterwards twisting the ends of the ligature, a degree of compression may be applied

PLATE XXX.

Fig. 1.

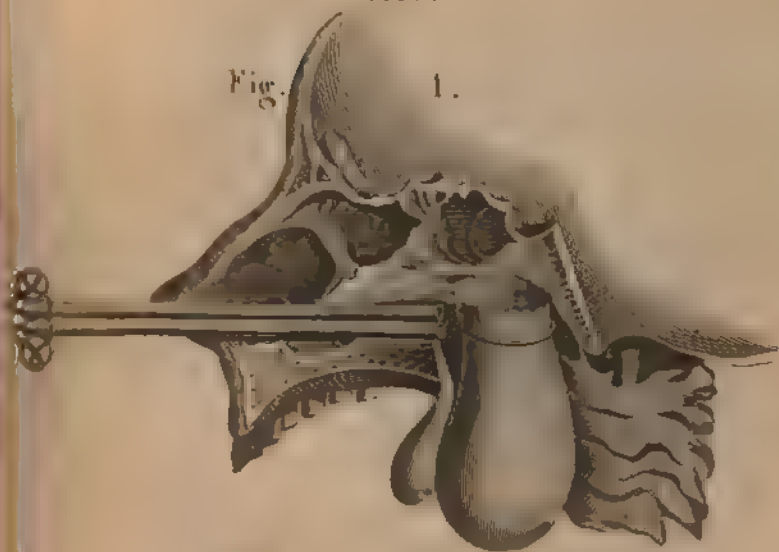


Fig. 2.







PLATE XXXIII.

Fig. 1.

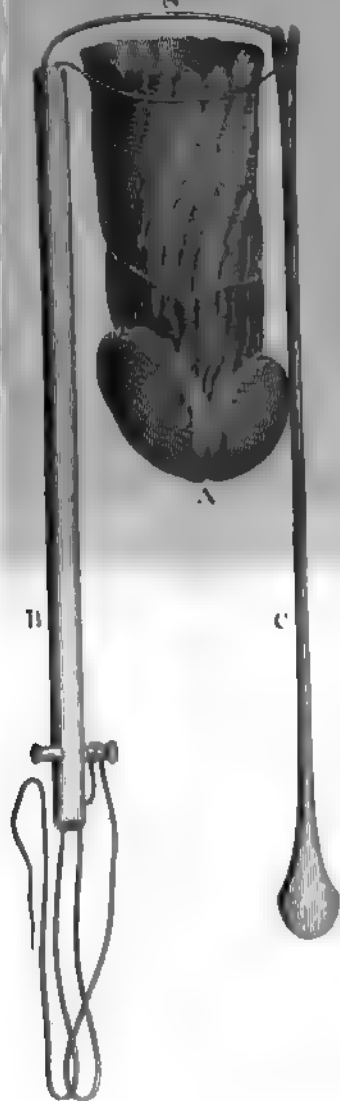


Fig. 2.



Fig. 3.



applied upon the root of the polypus sufficient for making it drop off; but it would not answer in every case; and as the method with the canula, Plate XXXI., is not only more easy but more effectual, the other will never probably be used.

PLATE XXXIII.

Fig. 1. A polypus of such a size that it filled the nostril completely, and was removed with a ligature as is here represented. *A*, The extremity of the polypus which appeared without the nostril. *C*, A probe of silver or any other metal, split at the end, in such a manner as to retain a piece of catgut or silver-wire; the doubling of which being inserted into the slit, should be pushed up to the root of the polypus on one side, while the tube *B* being passed upon the two ends of it, must be pushed up to the root of it on the opposite side, when the ligature may be easily drawn to any necessary degree of tightness.

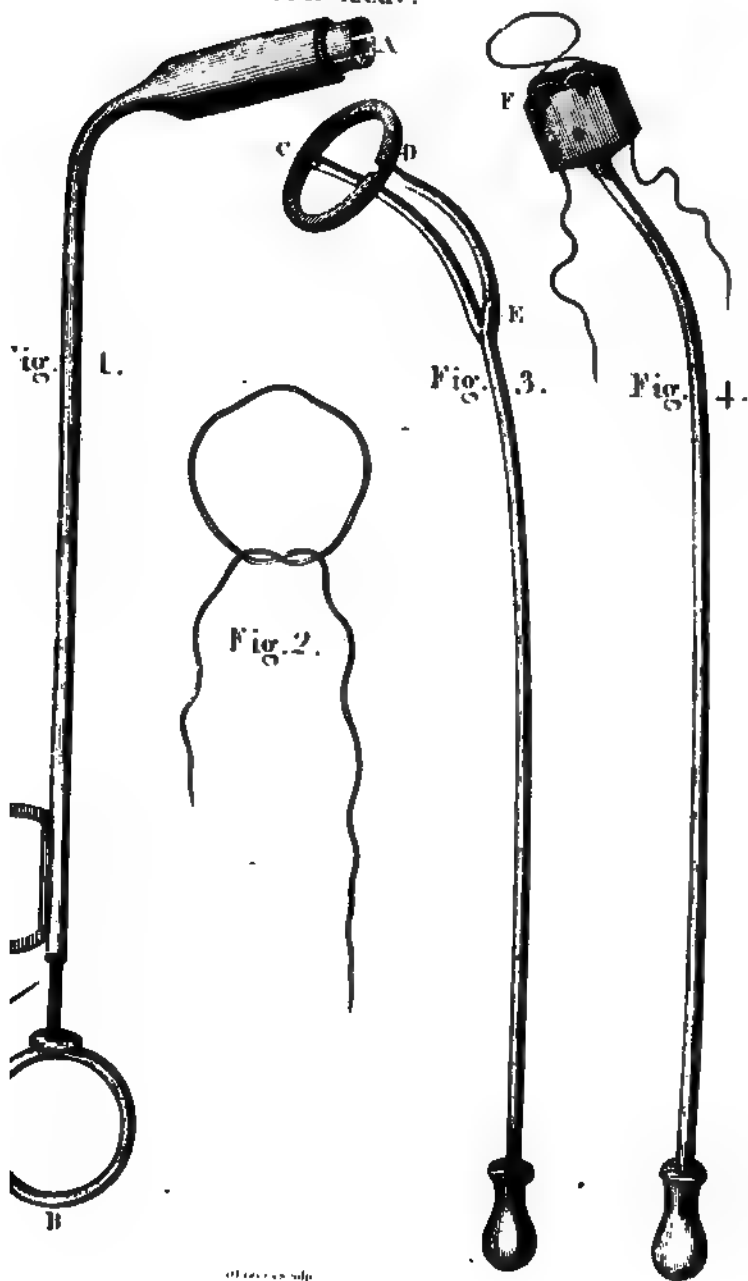
Fig.

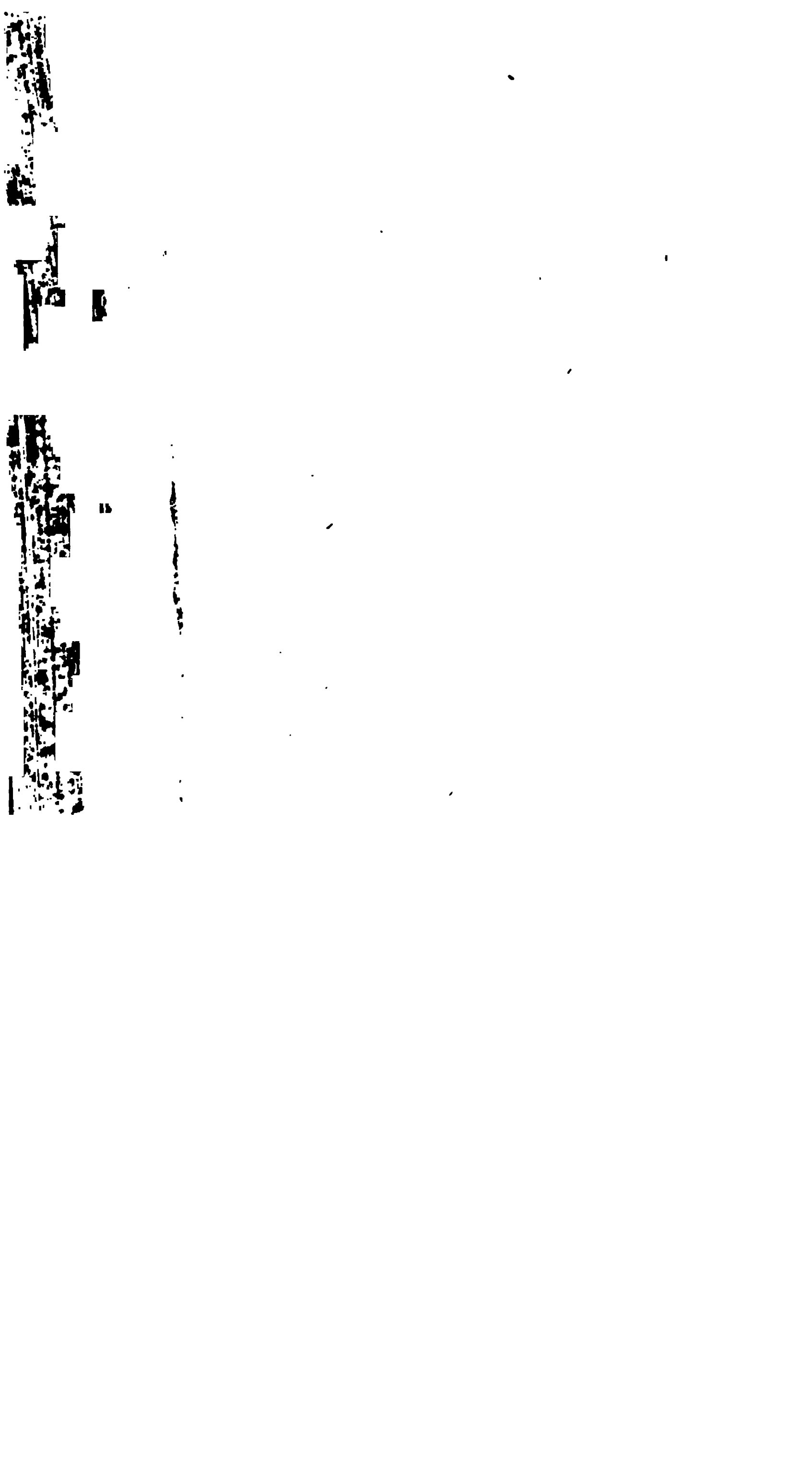
Fig. 3. A slit-curved probe, which may be used for the same purpose, namely, for applying a ligature to the root of a polypus in tumors seated in the throat. By this simple invention a ligature may be carried to the throat of almost every polypus that can occur.

PLATE XXXIV.

Fig. 1. An instrument for applying caustic to any part of the mouth or throat. It may be made of silver or any other metal. *A*, A moveable tube in which the caustic is fixed, when by pulling the ring at the other end, it must be drawn so far into the surrounding canula as to be completely covered with it; when the end of the instrument being applied upon the part affected, the caustic must be again pushed forward to a proper length, which may be always ascertained with accuracy by means of the small pin tied by a thread to the ring at the opposite end of it. This, as well as the instruments of Plate XXXIII. I am favoured with by Dr Monro, whose improvements

PLATE XXIV.





ments in surgery are numerous and important.

Figs. 2. 3. and 4. Are different parts of an instrument mentioned in Section V, Chap. XII. Vol. IV. for the purpose of putting a ligature round a polypus in the throat.

Fig. 2. A waxed thread with a noose adapted to the size of the groove in the ring *CD*, fig. 3. *ED*, *EC*, Two tubular pieces of brass, each of which is two inches and a half long, supporting the ring which is placed horizontally upon them. At the upper ends of each they should be made perfectly smooth and round, so as to allow the thread to slide easily, and to prevent it from being cut by the edges of the tubes. *CD*, The apertures where the ends of the thread are inserted. *E*, One of the openings at which they are brought out. The other opening cannot be seen in this view of the instrument. The handle of the instrument is of strong wire, seven or eight inches long, and bent a little that it may be the more easily introduced.

Fig.

Fig. 4. An instrument for making a second noose. *F*, Two brass wheels fixed in a small case of brass. The two wheels are five-eighths of an inch broad, and half an inch deep. After forming a second noose, the ends of the thread should be passed over the wheels in the manner here represented, when the handle of the instrument being pushed upwards, a knot may be formed of any degree of tightness.

This instrument is evidently formed upon the same principle with the ring of Hildanus, Plate XXXI. fig. 3. and was the invention, I believe, of the late ingenious Mr Dallas, surgeon in Musselburgh.

PLATE XXXV.

Fig. 1. Curved forceps for extracting polypi from the throat, and from behind the velum pendulum palati.

Fig. 2. Straight forceps for extracting polypi from the nostrils.

Fig. 3. Forceps for the same purpose with the last, but somewhat different in form. The method of using both these
and

PLATE XXV.

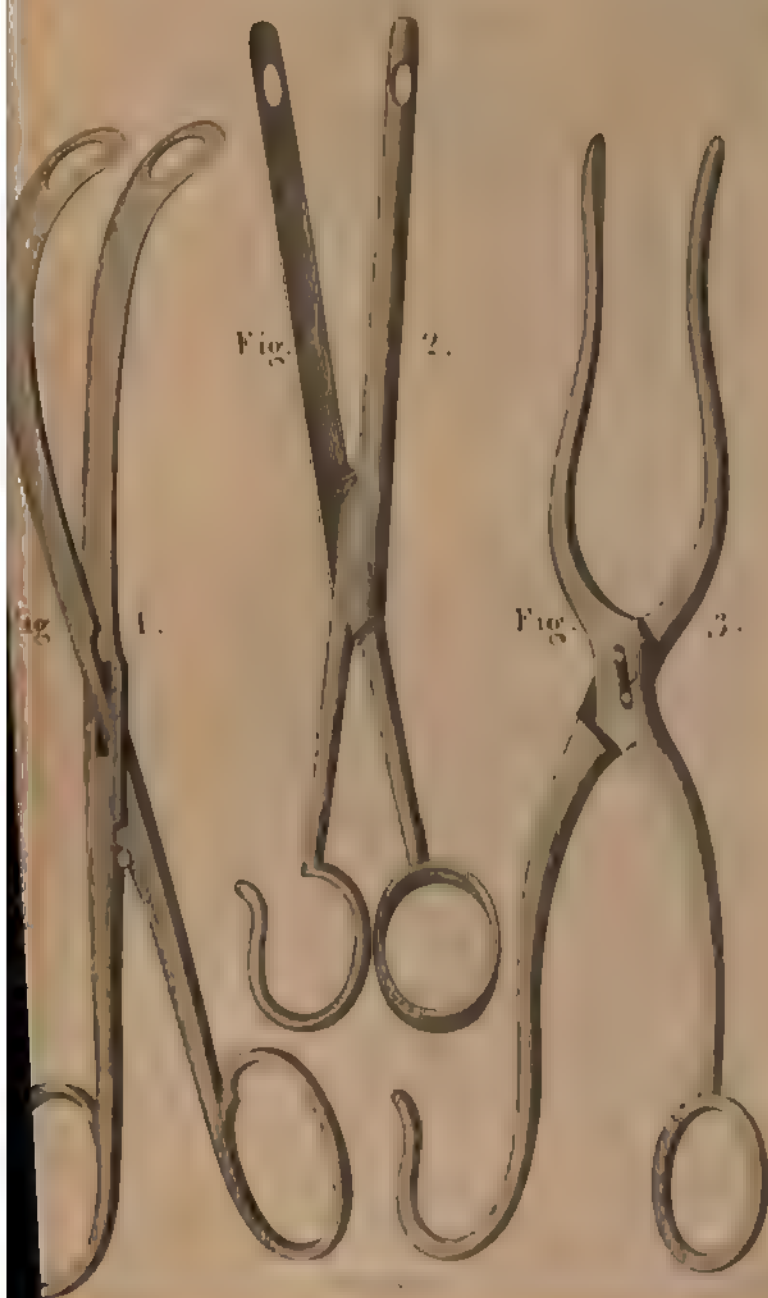






PLATE XXXVI.

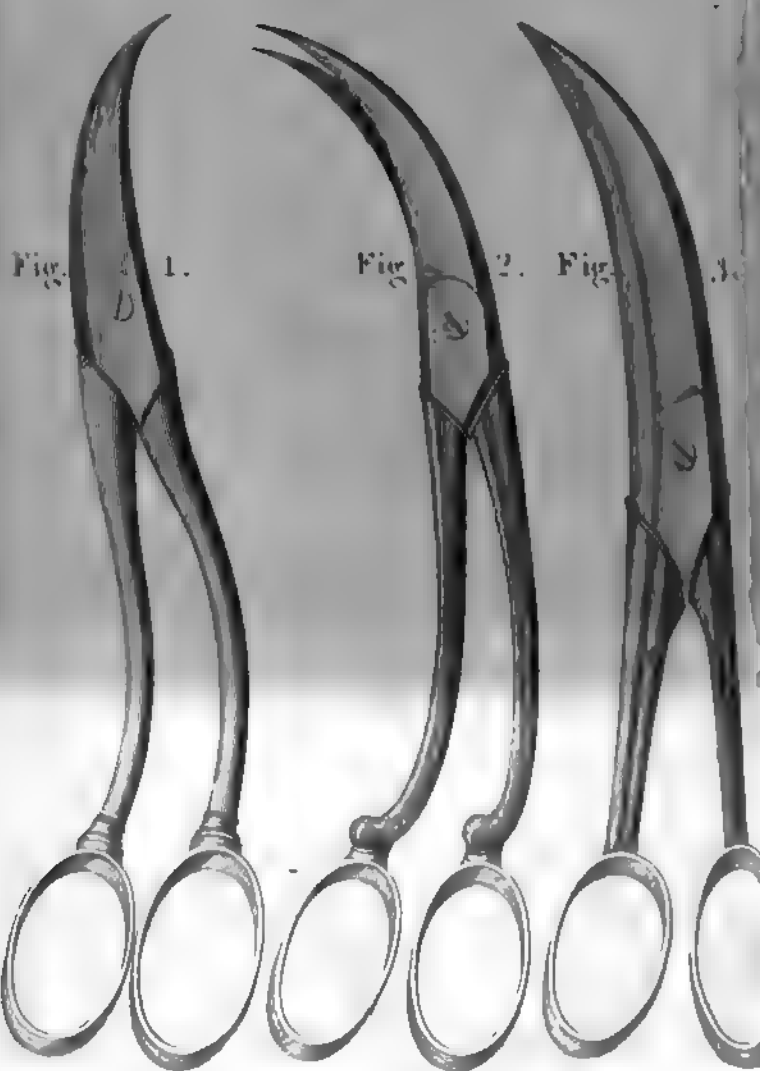


Fig. 4.





PLATE XXXII.

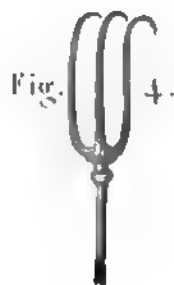


PLATE XXXII.

and the others, is described in Sect. V. Chap. XII. Vol. IV.

PLATE XXXVI.

Figs. 1. 2. and 3. Different forms of curved scissars, for extirpating tumors within the mouth, as well as for other purposes.

Fig. 4. An instrument nearly of the form of a fleme, which answers better than any other for scarifying the gums of children in dentition.

PLATE XXXVII.

Fig. 1. A scarificator for separating the gums from the roots of teeth intended to be extracted: It should be very sharp, but at the same time not so fine in the point or edge as to be hurt by being insinuated between the gums and the teeth.

Fig. 2. A curved trocar for perforating the antrum maxillare.

Figs. 3. and 4. Two dissecting hooks with two and three prongs, which answer better
for

for many purposes than the single pronged hook in common use. (1 . 1 ' ')

PLATE XXXVIII.

Fig. 1. An instrument for passing a ligature round the uvula or any other pendulous excrescence in the throat; but although the proposal is ingenious, it does not answer the purpose so well as the instruments delineated in Plate XXXI. figs. 1. 2. 3. and 4.

Fig. 2. An instrument first proposed by Mr Cheselden for tying a knot upon scirrhus amygdalæ after passing a ligature through the basis of the tumor, in the manner represented in fig. 3. The pin in fig. 2. is meant to represent a part upon which a knot is to be formed.

PLATE XXXIX.

Fig. 1. An instrument for removing the uvula by excision. That part of the uvula intended to be removed being passed through the opening in the body of the instrument, the cutting slider, which ought
to

PLATE XXXVIII.





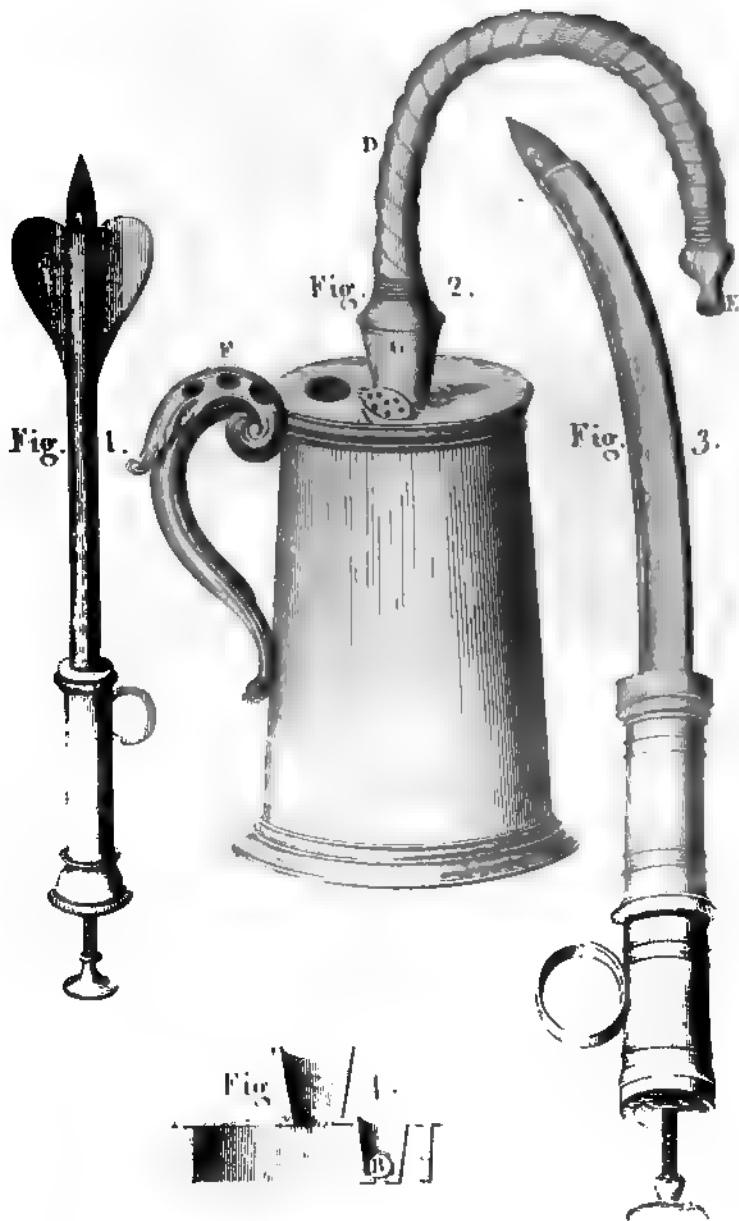
PLATE XXX.







PLATE AL.



to be very sharp, must be pressed forward with sufficient firmness for dividing it from the parts above.

Fig. 3. A curved probe-pointed bistoury, for removing small tumors in the throat or any part of the mouth; and fig. 2. forceps for laying hold of tumors intended to be removed in this manner.

PLATE XL.

Figs. 1. and 3. Two scarificators of different forms for opening abscesses in the throat, and for scarifying the amygdalæ. The two wings with which the canula of fig. 1. is furnished, are intended for compressing the tongue, while the point of the instrument is passed more deeply into the throat.

Figs 2. and 4. Mr Mudge's machine, for conveying steams of warm water and other liquids to the throat and breast. Fig. 2. The inhaler as it appears when fitted for use, except that the grating *A*, which then ought to cover the hole, is

now turned back, to shew the opening into the valve. Fig. 4. A section of the cover, in which is shewn the construction of the cork-valve *B*, and also the conical part *C*, into which the flexible tube *D* is fixed.

When the inhaler, which holds about a pint, after being three parts filled with hot water, is fixed at the arm-pit under the bed-clothes, the end of the tube *E* is to be applied to the mouth; the air, in the act of respiration, then rushes into the apertures *F*, and passing through the hollow handle, and afterwards into a hole in the lower part, where it is soldered to the body, and therefore cannot be represented, it rises through the hot water, and is received into the lungs, impregnated with vapour. In exspiration, the contents of the lungs are discharged upon the surface of the water; and instead of forcing the water back through the hollow handle, the air escapes by lifting the round light cork valve *B*, so as to settle upon the surface of the body under the bed-clothes.

Thu.

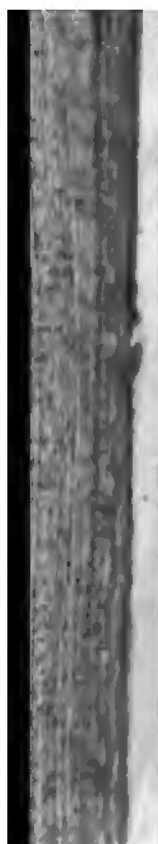
Thus the whole act of respiration is performed, without removing the instrument from the mouth.

The flexible part of the tube *D* is about six inches long, fitted with a wooden mouth-piece *E* at one end, and a part *G* of the same materials at the other, to be received into the cone *C* on the cover. This flexible tube is made by winding a long slip of silk oil-skin over a spiral brass-wire; which is then covered with one of the same size, of thin silk, and both secured by strong sewing silk wound spirally round them. Some length and degree of flexibility is necessary to this tube, for the sake of convenient accommodation to the mouth when the head is laid on the pillow.

Care should be taken to make the cover fit very exactly; otherwise the defect should be remedied by winding a piece of cotton-wick, or some such contrivance, round the rim beneath the cover, so as to make it air-tight. The cork, likewise, which forms the valve, should, for the
same

same reason, be made as round as possible. It is also necessary to remark, that the area of the holes on the upper part of the handle taken together; the size of the hole in the lower part of the handle which opens into the inhaler; the opening of the conical valve itself; and that in the mouth-piece; as well as the cavity or inside of the flexible tube, should be all equally large, and of such dimensions, as to equal the size of both nostrils taken together; in short, they should be severally so large as not only not to obstruct each other, but that respiration may be performed through them with no more labour than is exerted in ordinary breathing.







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